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NAVAL OCEAN SYSTEMS CENTER SAN DIEGO CA
AMBULATOR FOR PARAPLEGICS: ENGINEERING DRAWINGS.(U)
NOV 78 R A GARRET, J WIER
NOSC/TD-208

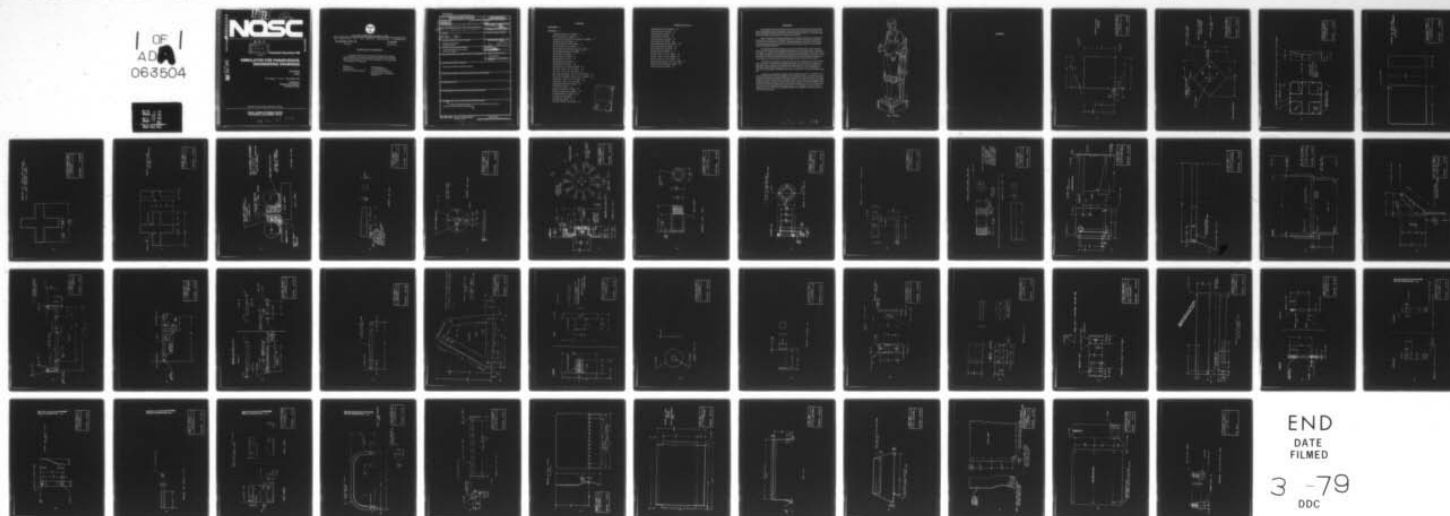
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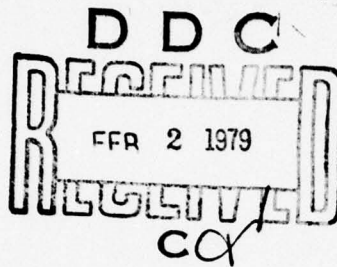
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NOSC TD 208



Technical Document 208

AMBULATOR FOR PARAPLEGICS: ENGINEERING DRAWINGS

RA Garrett
J Weir

Final Report: 17 June - 1 November 1978

Prepared for
Veterans Administration
Prosthetics Center

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NAVAL OCEAN SYSTEMS CENTER
SAN DIEGO, CALIFORNIA 92152

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DISCUSSION

The ambulator discussed in this report is one part of a three-phase plan to develop an integrated transportation system for paraplegics. The development of the system is sponsored by the Veterans Administration Prosthetics Center (VAPC) and is being developed as a cooperative effort between the VAPC and the Naval Ocean Systems Center (NOSC).

Phase I consisted of the design and fabrication of a prototype ambulator (the drawings for this device are contained in the remainder of this report). Phase II is the design of a wheelchair which will accept the ambulator, forming the ambulator/wheelchair subsystem. Phase III will be concerned with the design of a street vehicle that will functionally accommodate the integrated ambulator/wheelchair subsystem.

The ambulator/wheelchair subsystem consists of two modules which can be separated to provide increased mobility for the paraplegic while supported in the upright position. The ambulator (figure 1) contains an erecting mechanism powered by an electric motor-driven jackscrew fixed to a small, stable platform. This provides the paraplegic with the capability to be raised into a fully erect position, and it also allows the ambulator to be detached from the wheelchair's mainframe. The occupant can then move away from the wheelchair and move about under his control.

The ambulator is self-powered and provides the user with a high degree of maneuverability. When returning to the wheelchair, an engagement mechanism on either side of the ambulator engages rollers on the wheelchair. This causes the wheelchair to return to the sitting position and raises the ambulator base several inches off the floor. The ambulator is then automatically re-attached to the wheelchair's mainframe and becomes an integral part of the main wheelchair assembly.

In addition to providing the paraplegic with the capability to stand or sit at will, it is felt that the ambulator will provide the paraplegic with better general health. It will allow him to load his skeleton periodically, providing the bone stress needed to reduce calcium washout. (The latter condition can result in loss of calcium, especially in the bones of the legs and pelvic region). Standing will also improve circulation and relieve those pressure areas which cause tissue breakdown and decubiti. The ambulator will also make it easier for the paraplegic to live in an environment where most functions are accomplished in an upright position, e.g., cooking at a range or working at a workbench or sink. However, the psychological benefit of the capability to converse at eye level may be the greatest benefit.

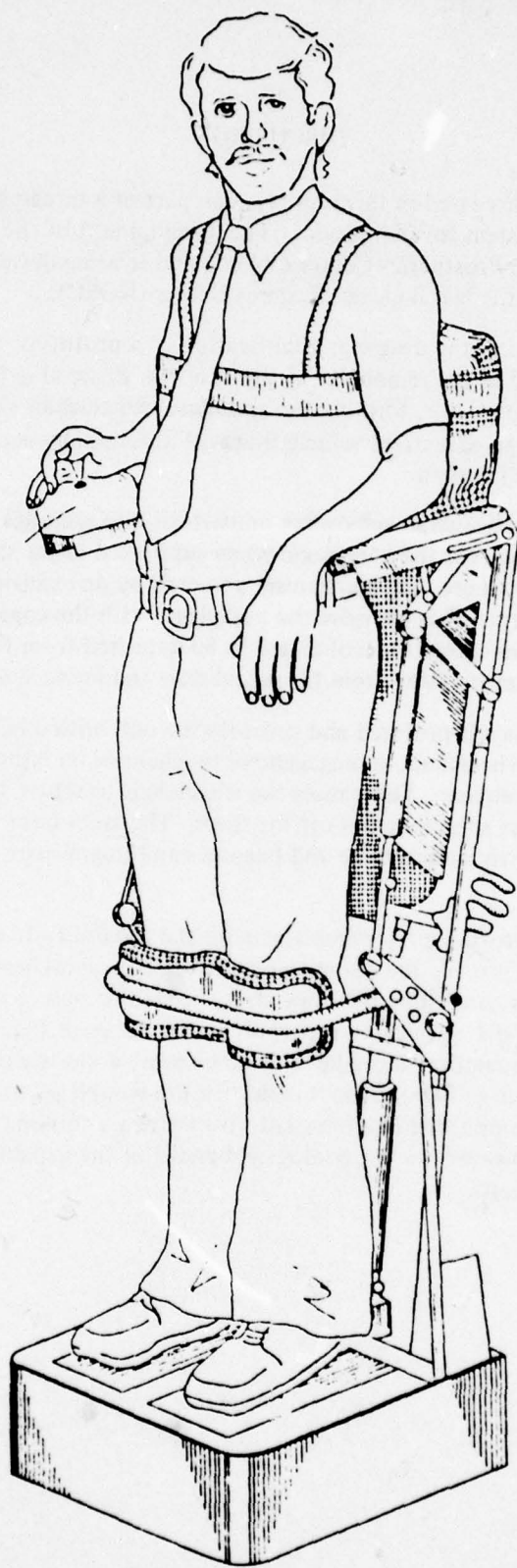
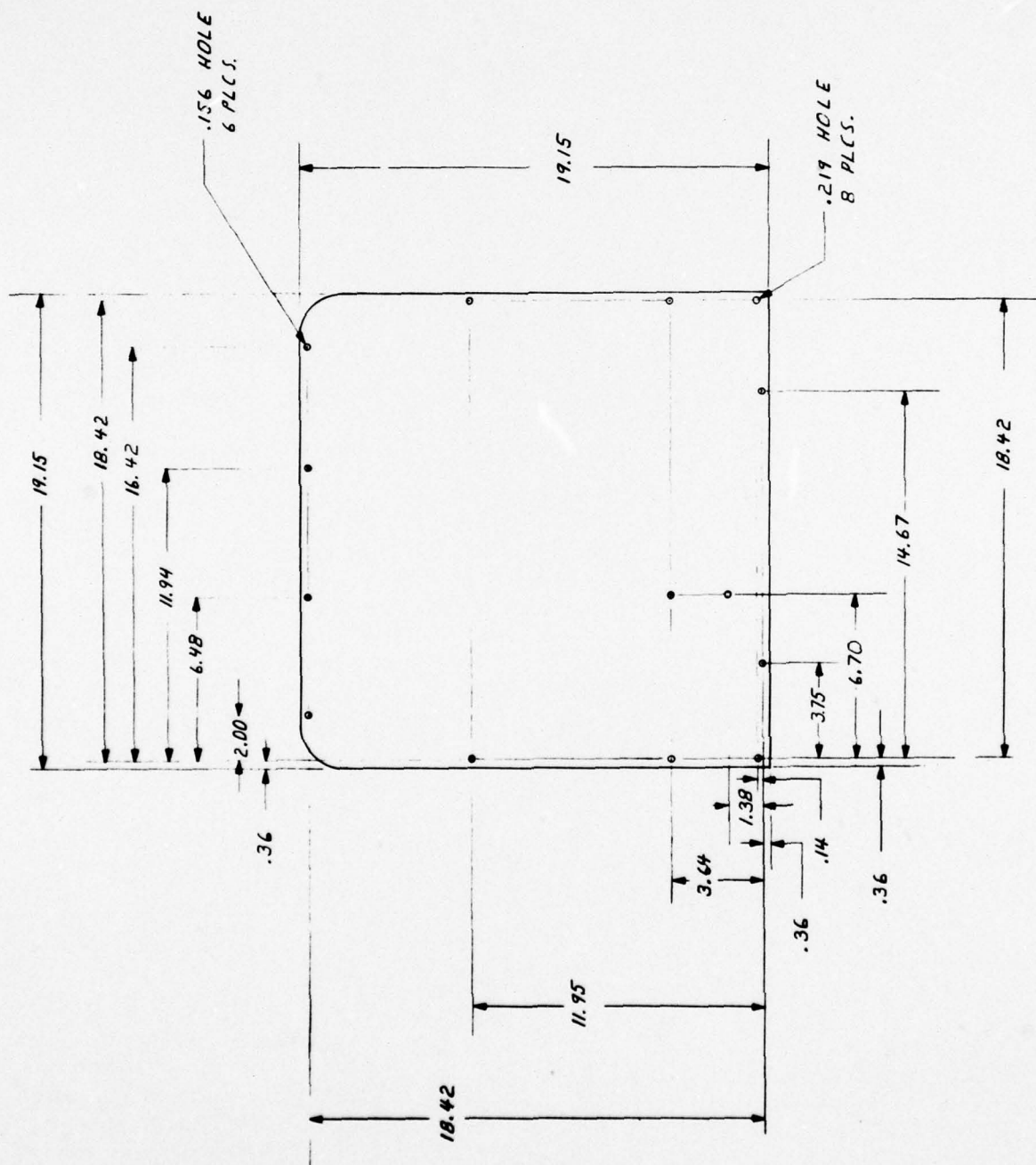


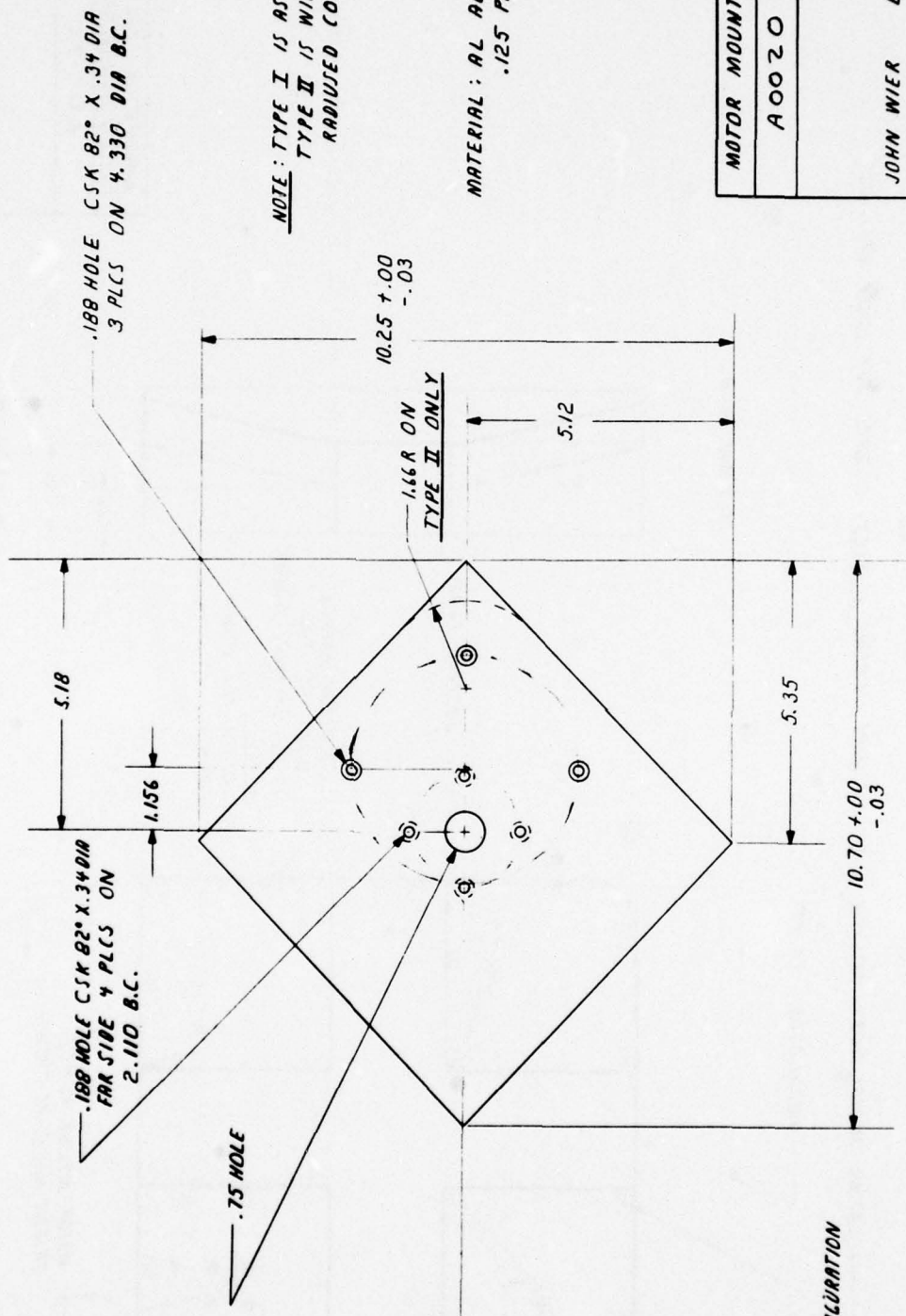
Figure 1. Ambulator.

DRAWINGS



MATERIAL: AL ALLOY
6061-T6
.09 THICK

AMBULATOR BASE COVER
A 0010
JOHN WIER
EXT 2772



NOTE: TYPE I IS AS SHOWN
TYPE II IS WITH ONE
RADIUSED CORNER.

MATERIAL: AL ALLOY 6061-T6
.125 PLATE

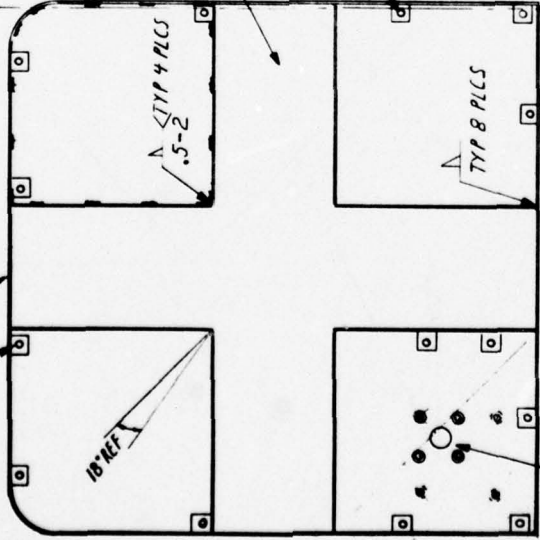
MOTOR MOUNT PLATE
A 0020
JOHN WIER EXT 7372

FOR 19.155 CONFIGURATION

—FLOATING ANCHOR NUTS 90° FOR 6-32 MACHINE SCREWS 6 PLCS LOCATE PER COVER DRAWING

AMBULATOR SKIRT

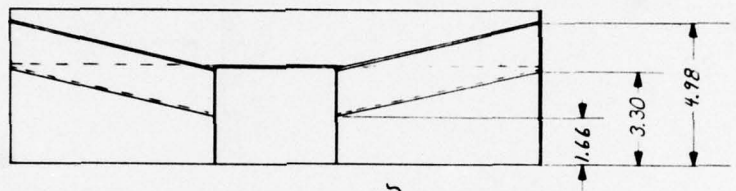
A



BATTERY TRAY

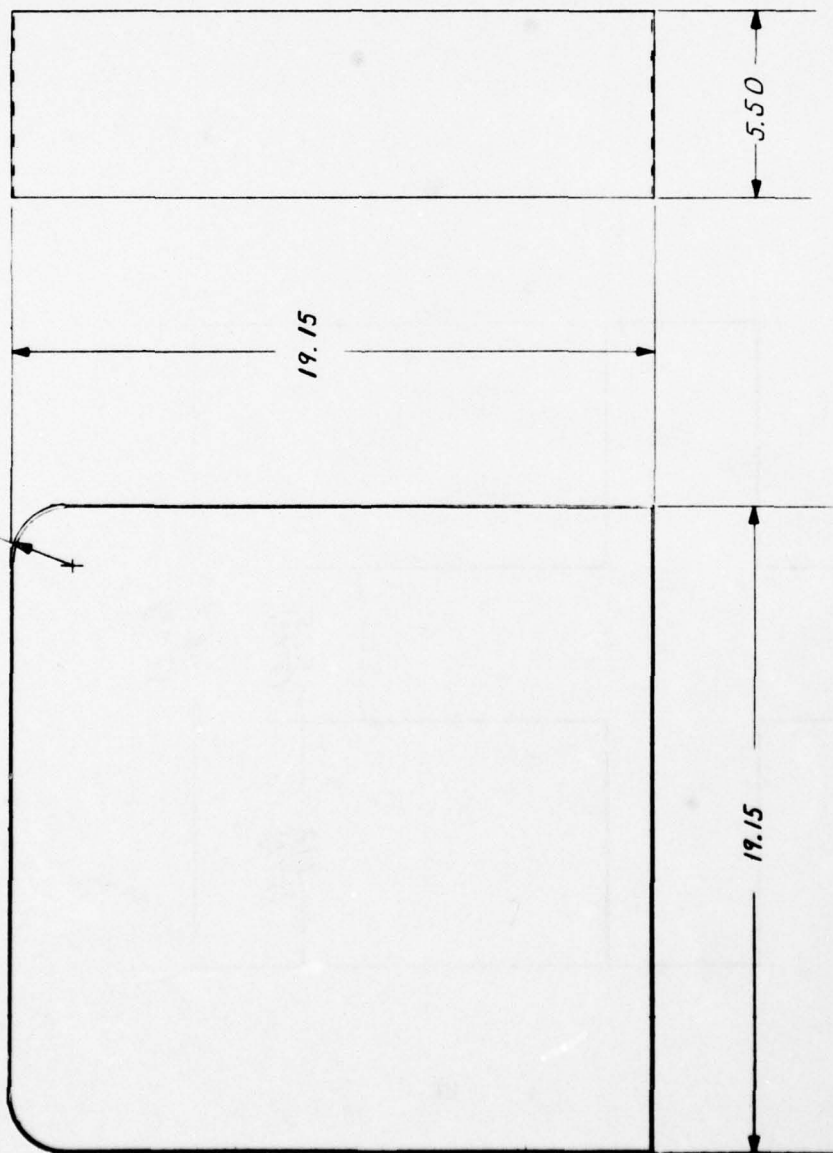
FLOATING ANCHOR NUTS 90° FOR 10-32 MACHINE SCREWS 8 PLCS LOCATE PER COVER DRAWING

SECTION A-A



AMBULATOR PART ORIENTATION AND ASSEMBLY
A 0030
JOHN WIER EXT 7372

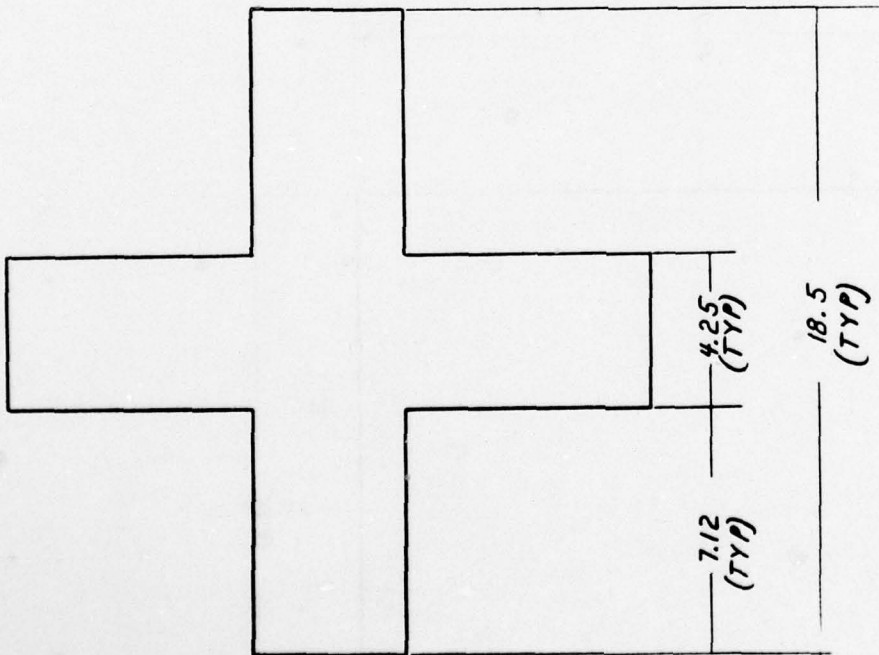
1.75 R 2 PLCS



MATERIAL: AL ALLOY 5052
OR 6061 AS AVAILABLE
.09 THICK

AMBULATOR SKIRT	
A0040	
JOHN WIER	EXT 7372

MATERIAL: AL ALLOY 5052 OR 6061
 AS AVAILABLE .06 THICK
 FINISH: HRRD ANODIZE, CLEAR



ELECTRONICS MOUNT PLATE	
A0050	
JOHN WIER	EXT 7372

Figure 11 is a schematic diagram of a rectangular structure, likely a building footprint or a large container, divided into several rectangular sections. The dimensions are given in feet:

- Total width: 18.97'
- Width of the central section: 7.25'
- Width of the side sections: 4.47'
- Width of the top section: 3.50'

Labels and annotations include:

- "2 MGS" with an arrow pointing to the top-left section.
- "4 PLCS" with an arrow pointing to the top-right section.
- A small "6" is located near the top-left corner.

BATTERY TRAY
A0060
JOHN WIER EXT 7372

20° CONTACT BEARINGS
(FAFNIR # 7203W OR EQ.)
(NOT REQUIRED)

BEARING SHAFT

MOTOR SHAFT (MODIFIED)
COUPLER PLATE

WHEEL CARRIAGE

MOTOR MOUNT ACCESS HOLE

BEARING ASSEMBLY
FOR WHEEL CARRIAGE

DRIVE MOTOR

BEARING HOUSING

BEARING SPACER
RING
(DELETED)

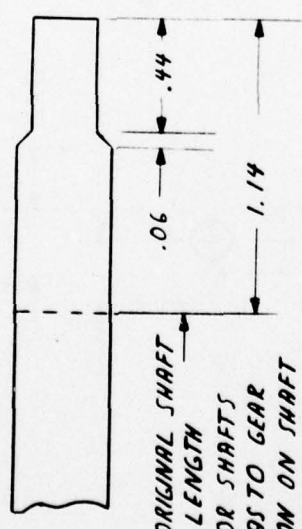
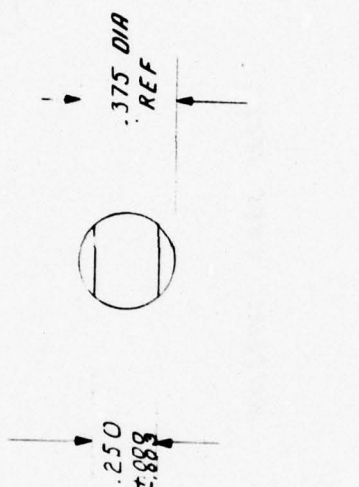
FULL SCALE

FOR ASSEMBLY REFERENCE

ONLY A 0070

NOTE: CROSSSECTIONS SHOWN ARE
NOT PER DRAWINGS.

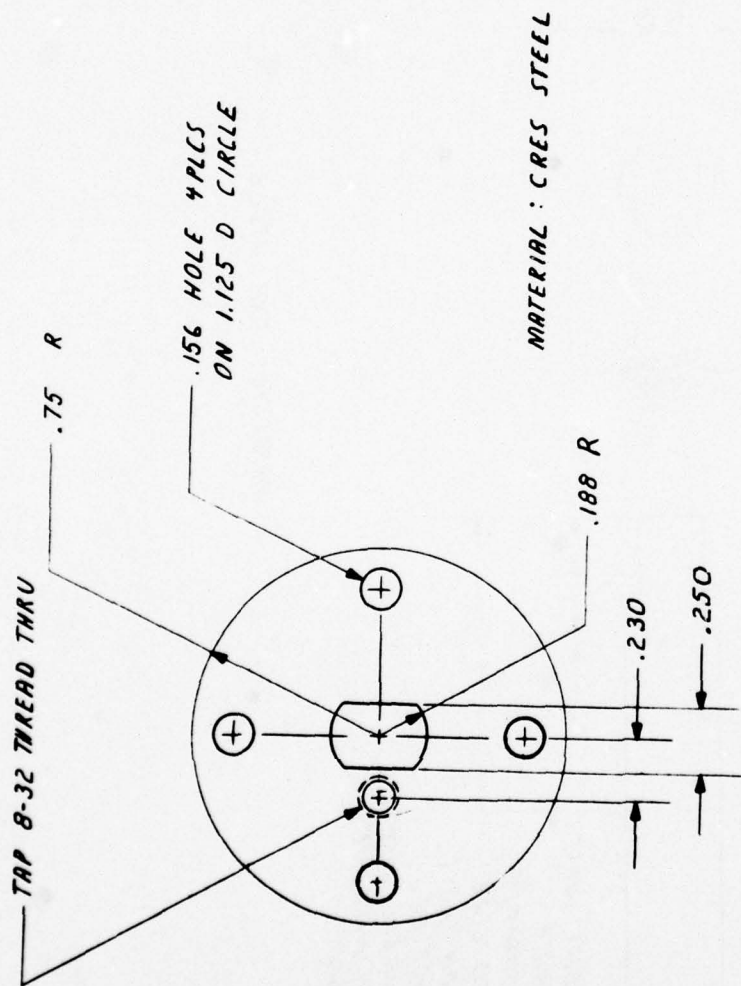
JOHN WIER EXT 7372



ORIGINAL SHAFT
LENGTH
NOTE: MOTOR SHAFTS
VARY AS TO GEAR
LOCATION ON SHAFT
AND MAY NOT BE
INTERCHANGEABLE BETWEEN
MOTORS WITH DIFFERENT
GEAR RATIOS.

MATERIAL: TOOL STEEL

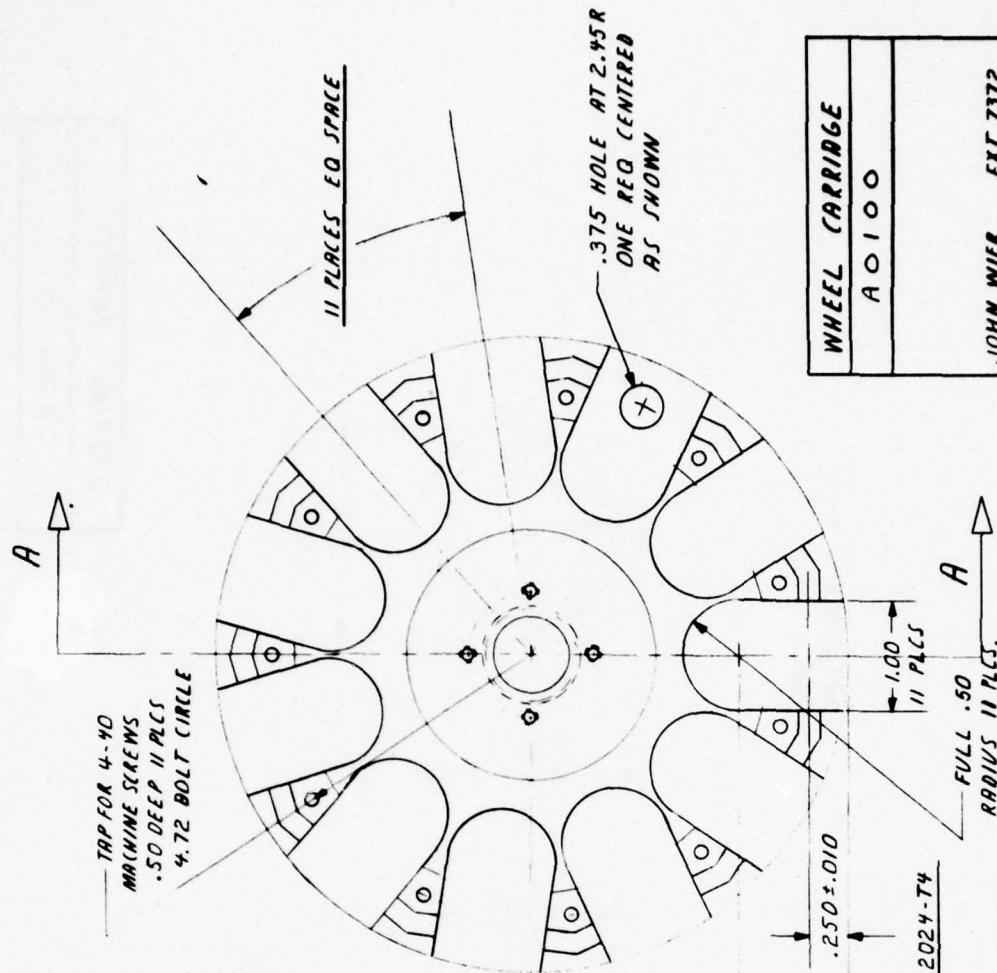
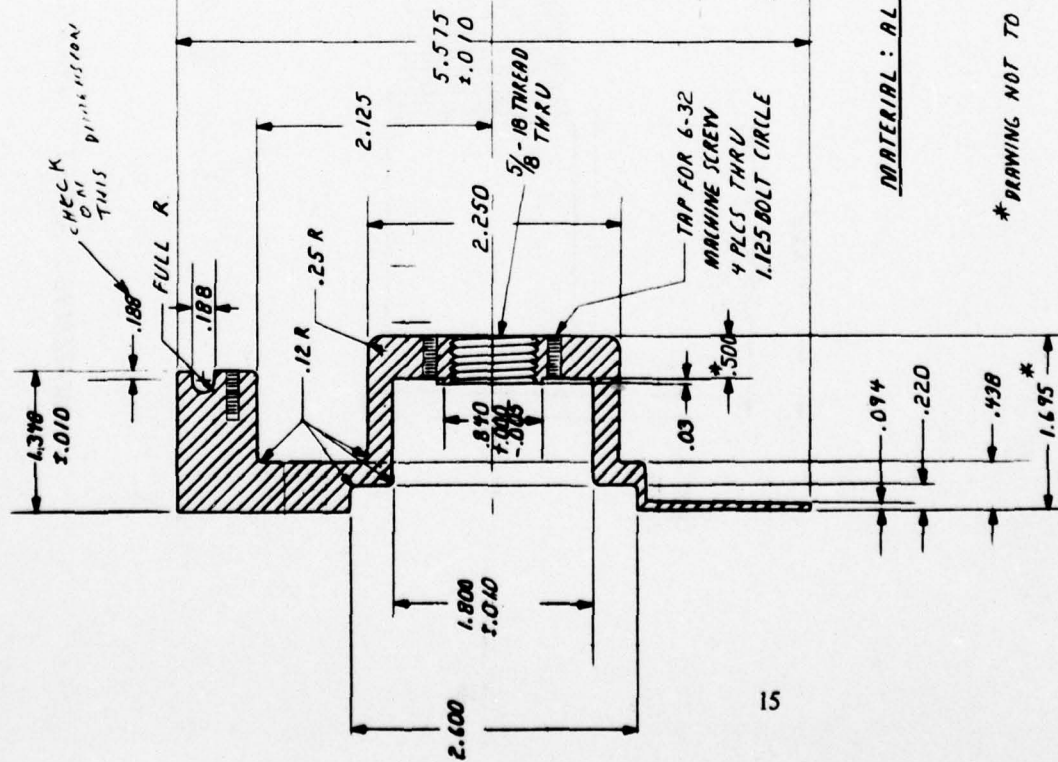
MOTOR SHAFT REPLACEMENT
A0080
JOHN WIER EXT 7372



MATERIAL : CRES STEEL

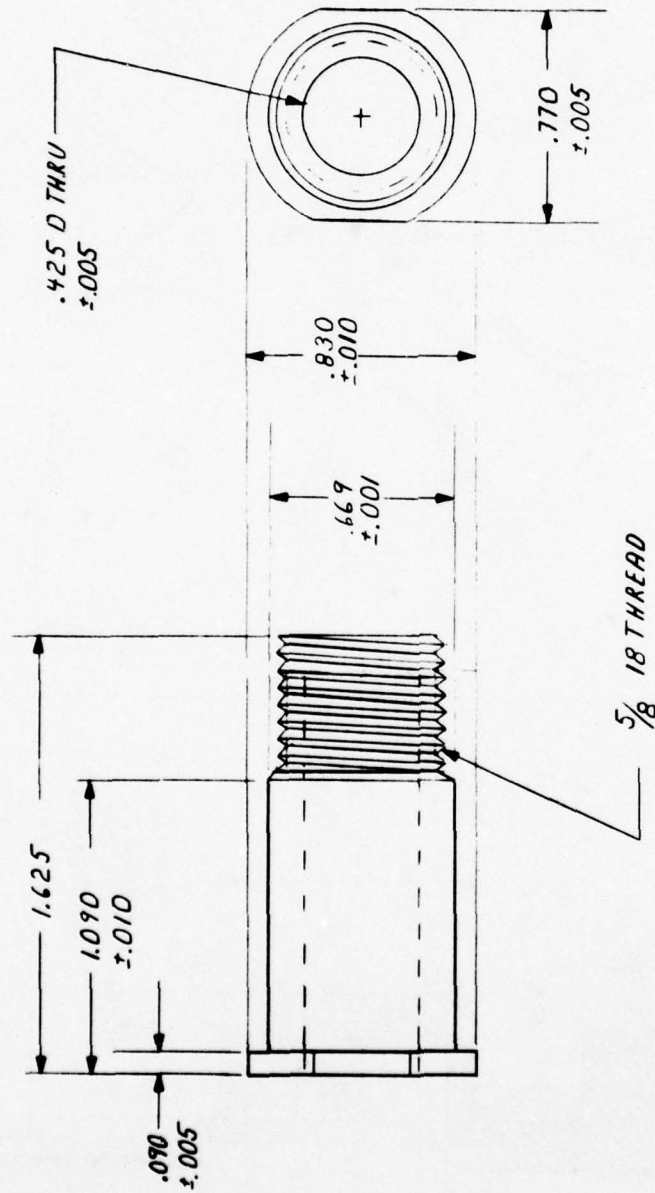
COUPLER PLATE	
A0090	
JOHN WIER	EXT 7372

SECTION A-A



WHEEL CARRIAGE
A0100
JOHN WIER EXT 7372

* DRAWING NOT TO SCALE

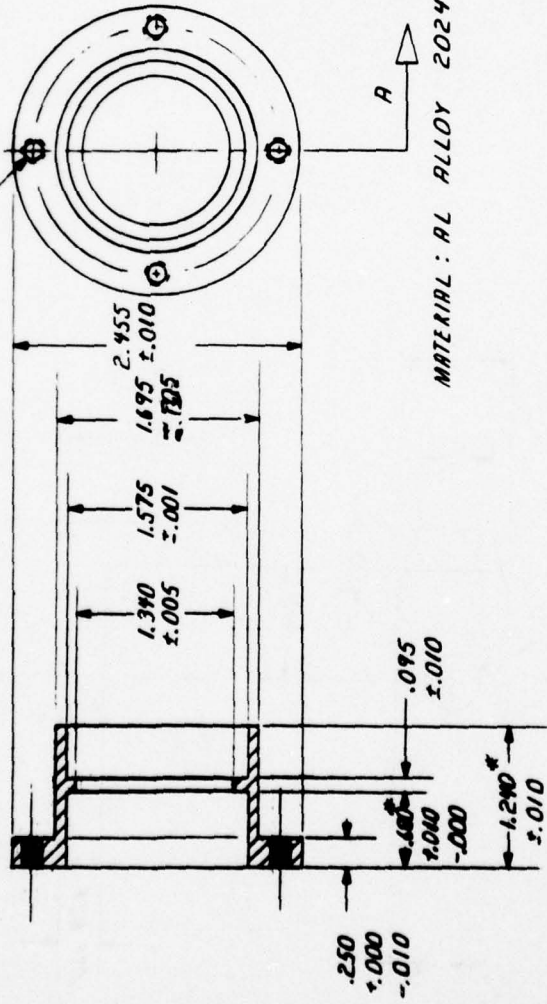


MATERIAL: CRES. STEEL

BEARING SHAFT
A0110
JOHN WIER EXT. 7372

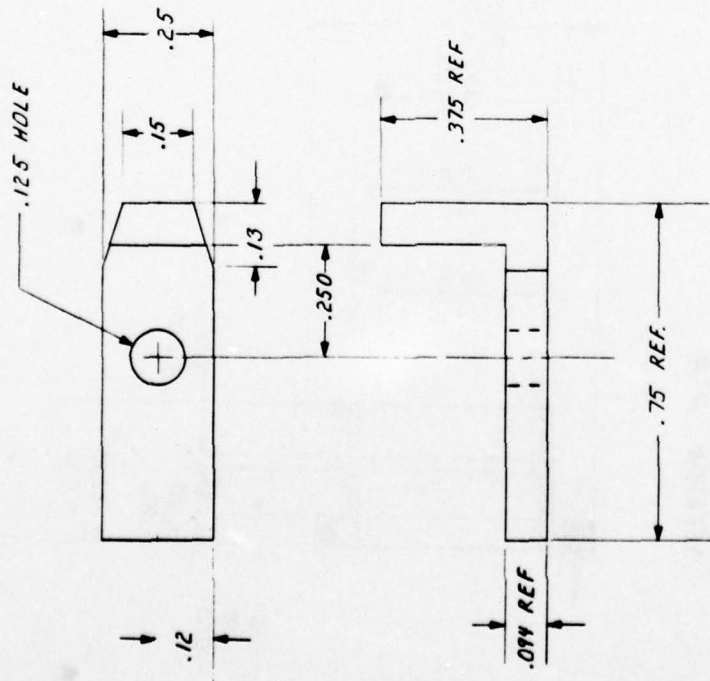
TAP FOR B-32 MACHINE SCREW
4 PLCS EQ SPACE ON 2.110 BOLT CIRCLE

SECTION A-A



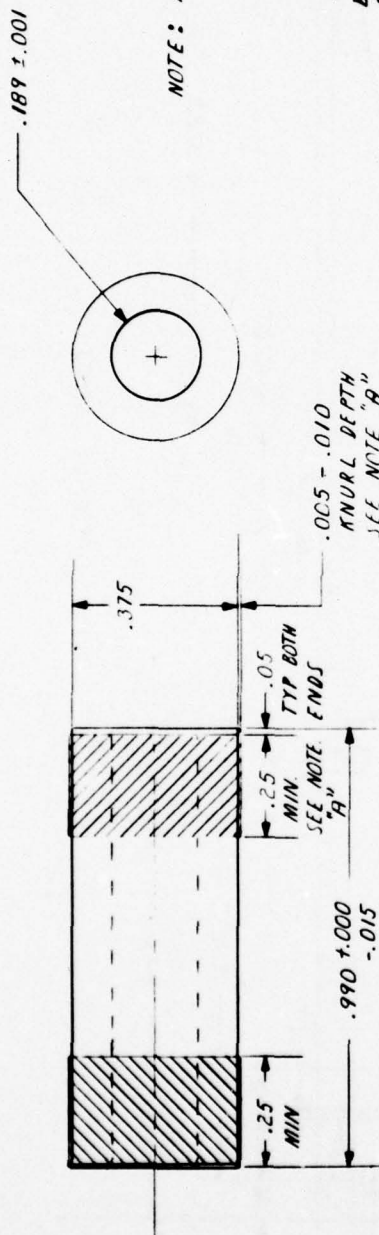
BEARING HOUSING
A0120
JOHN WIEL EAT 7372

MATERIAL : ALCOA ALUMINUM L SECTION # 1744

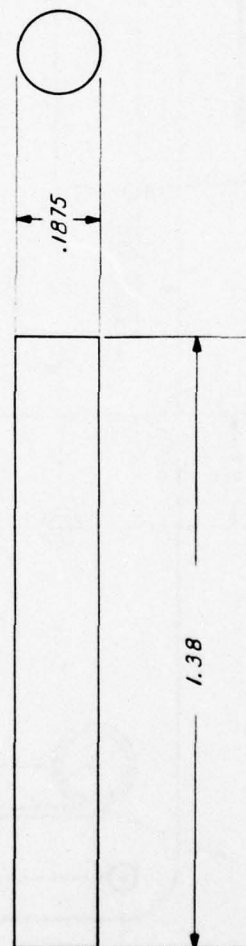


AXLE RETAINER
AO130
JOHN WIER EXT 7372

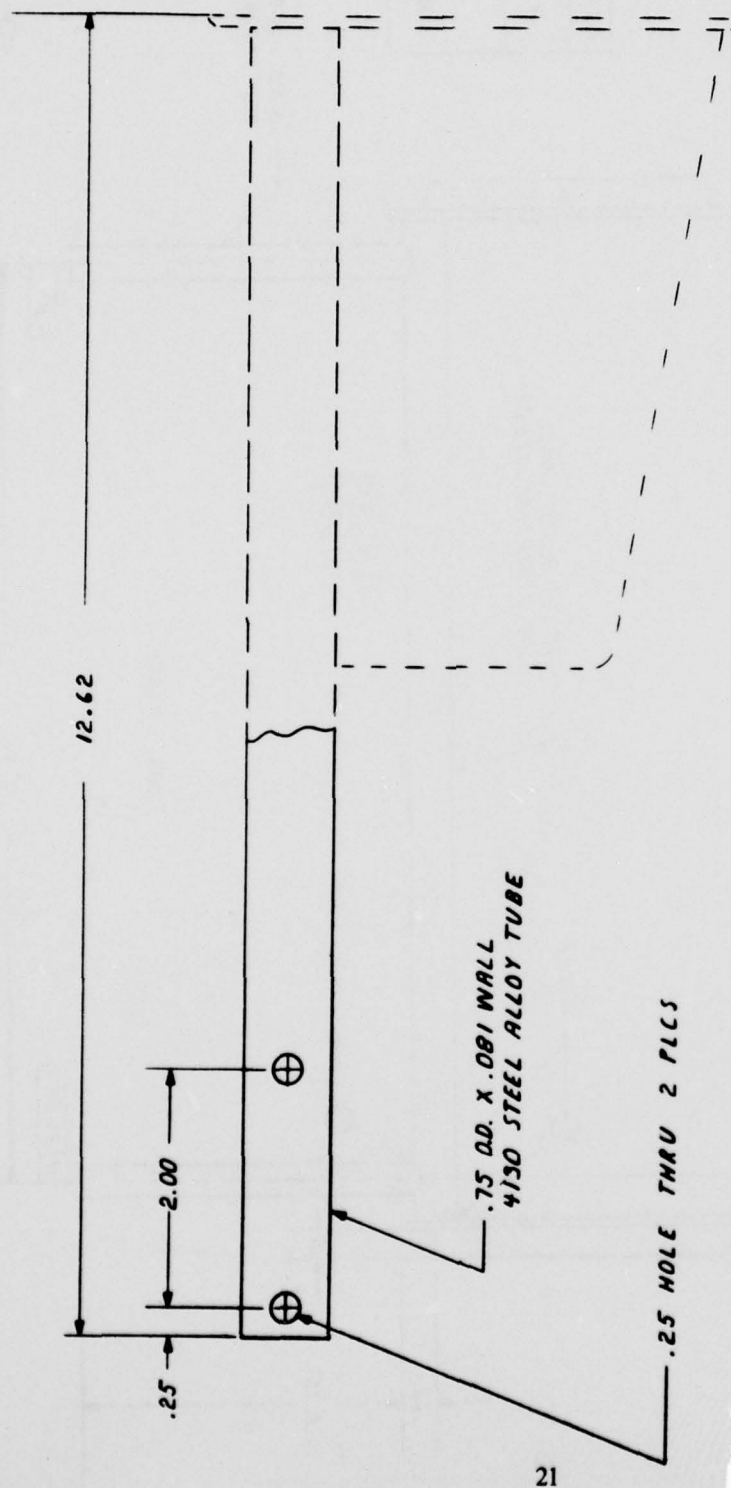
MATERIAL: BEARING BRONZE SAE 660



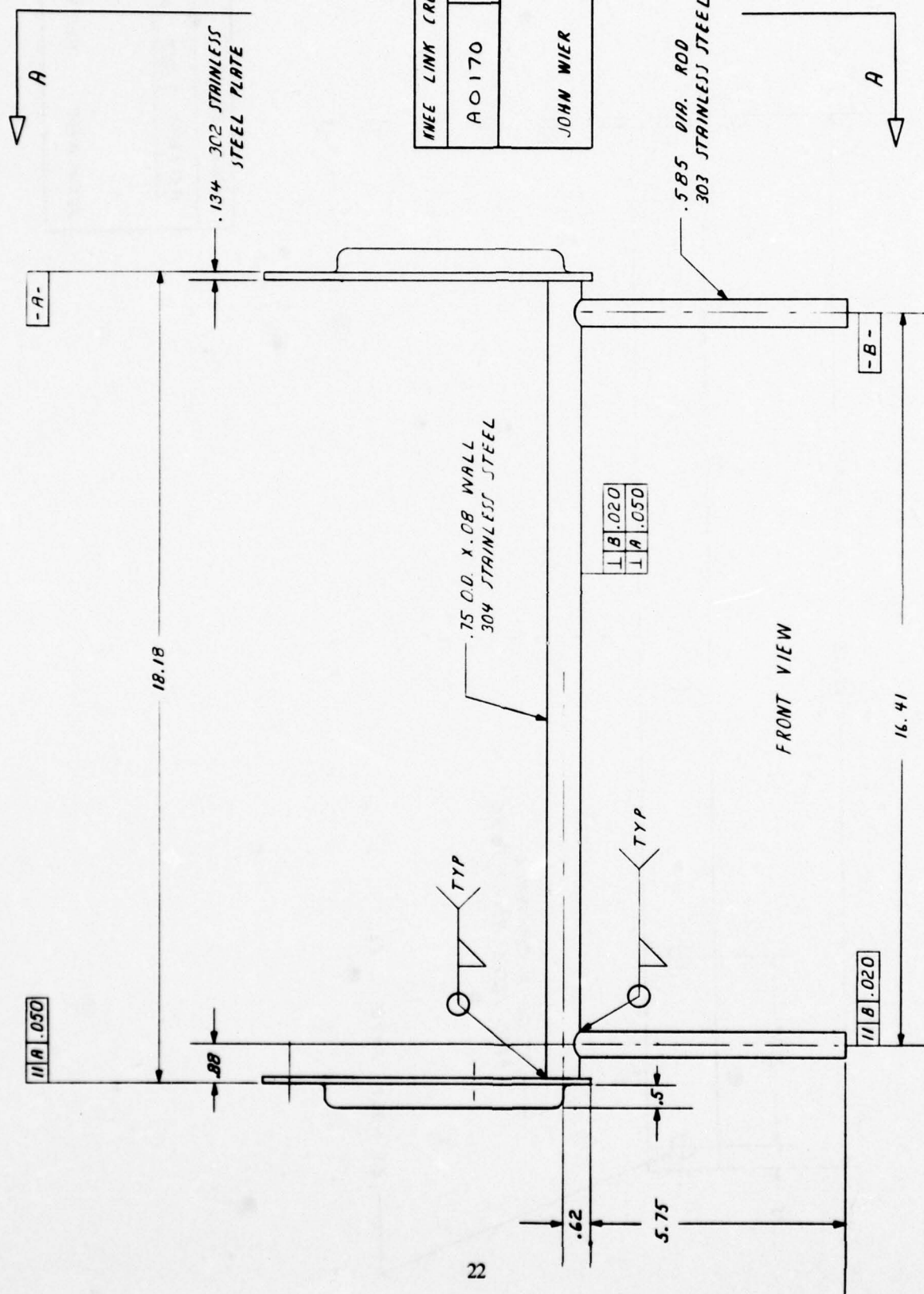
MATERIAL: CRES STEEL 303

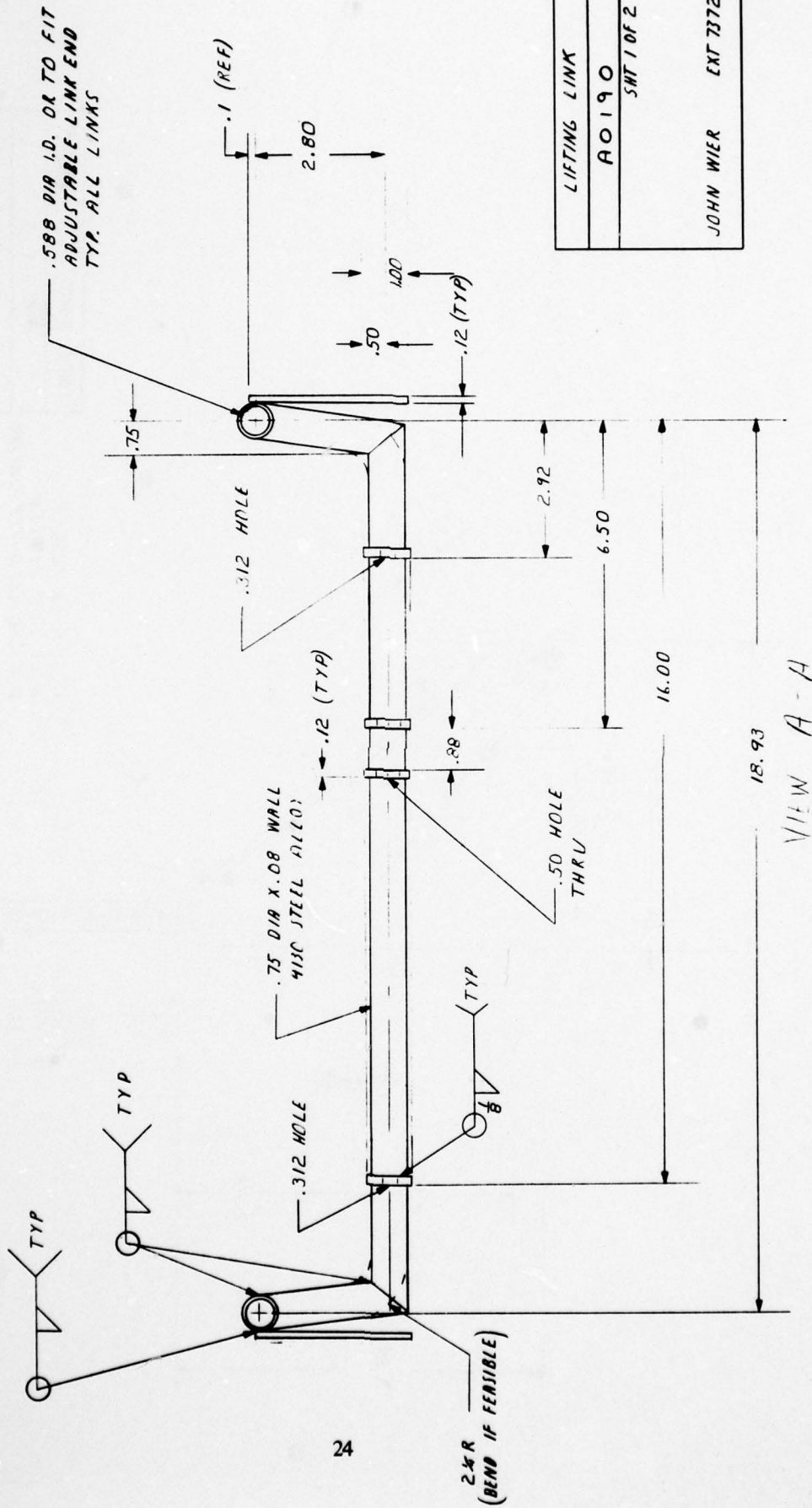


WHEEL BUSHING -
AXLE ROD
A0140
JOHN WIER EXT 7372



RISER TUBE	
A0160	SMT 2 OF 2
JOHN WIER	EXT 7372



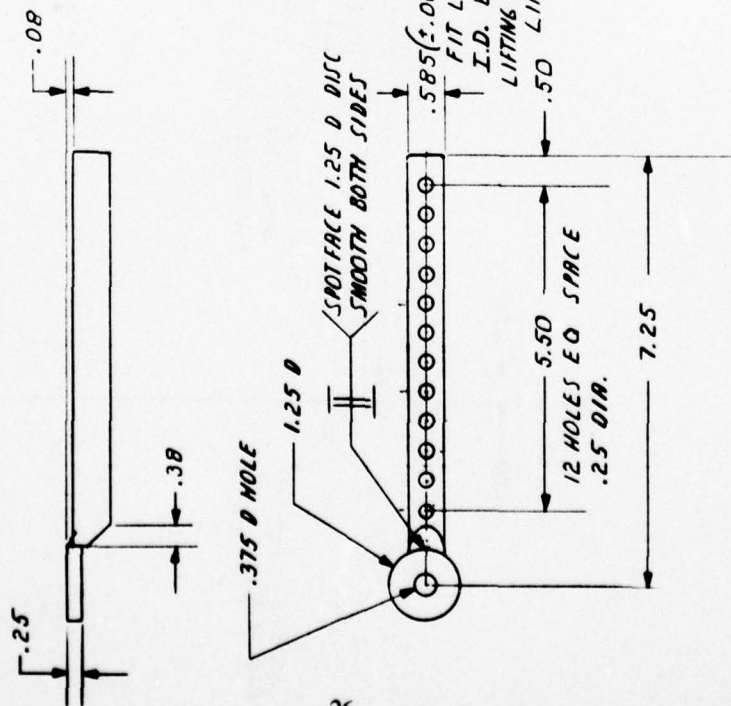




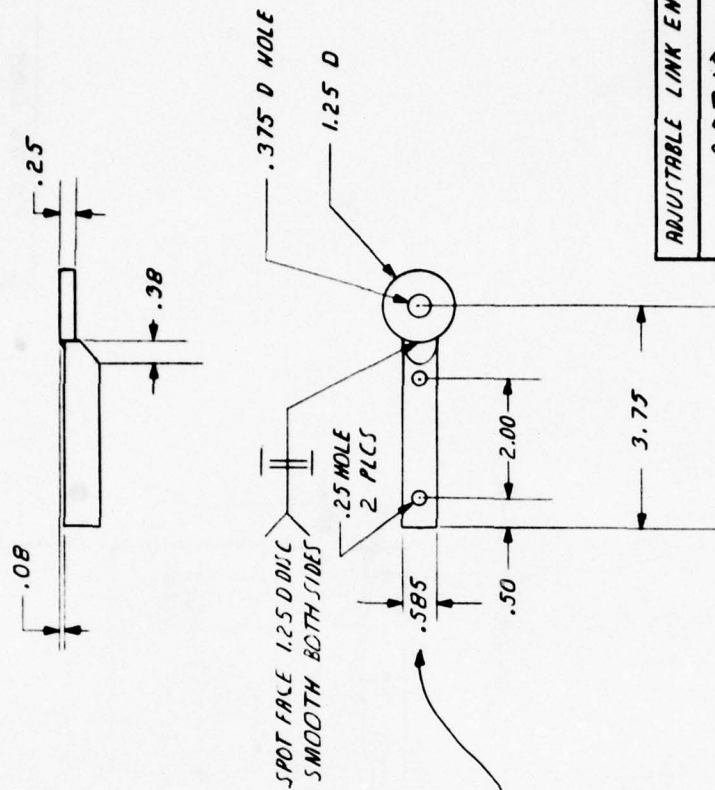
LIFTING LINK	
A0200	
SWT 2 OF 2	
JOHN WIER	EXT 7372

MATERIAL: 303 STAINLESS STEEL

TYPE A



TYPE B



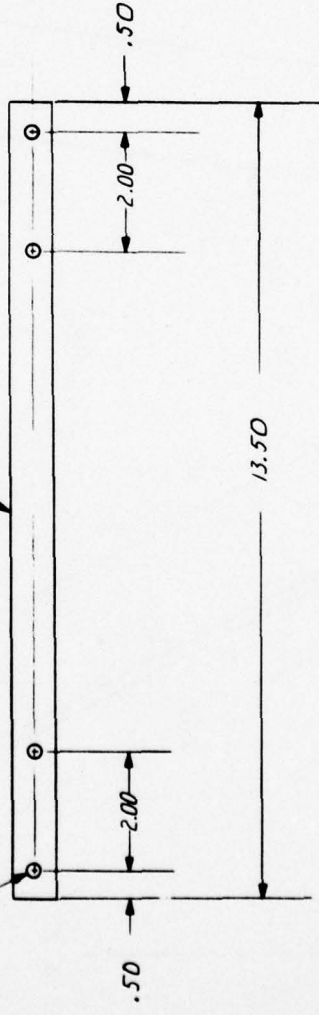
ADJUSTABLE LINK ENDS

A0210

JOHN WIER EXT 7372

.75 DIA X .081 WALL TUBE
4120 STEEL ALLOY

.25 HOLE 4 PLCS

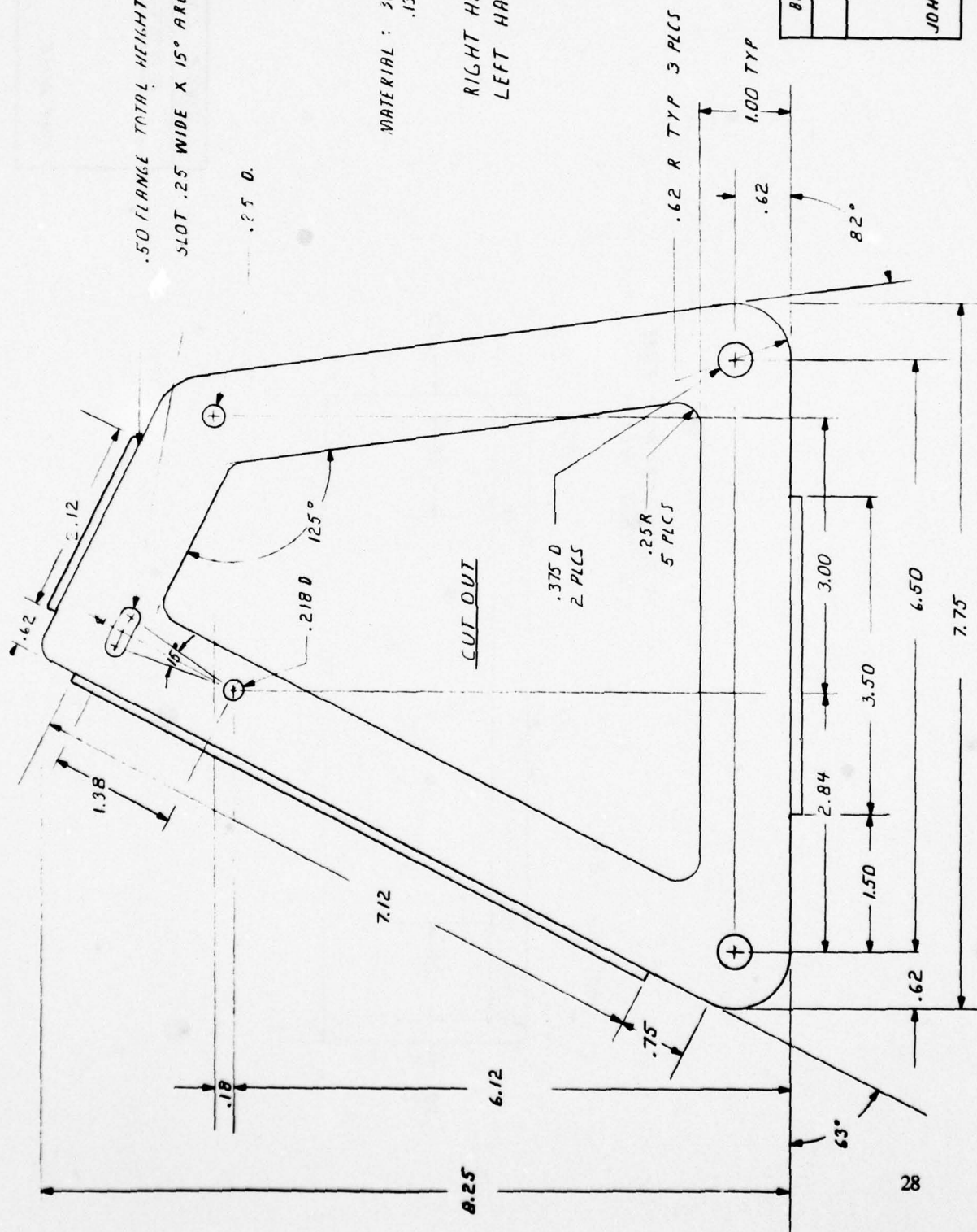


TOP LINK
A0220
JOHN WIER EXT 7372

.250.

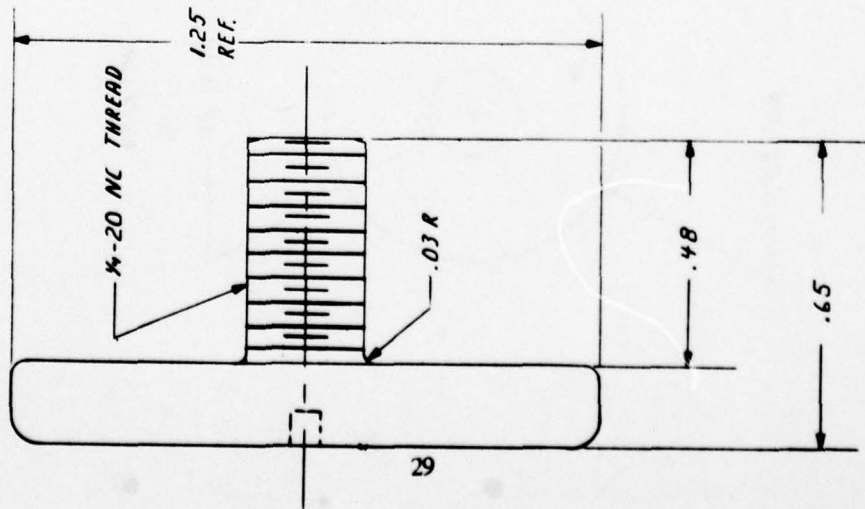
MATERIAL: 302 STAINLESS STEEL
.134 THICK

RIGHT HAND — SHOWN
LEFT HAND — FLANGES OPP SIDE

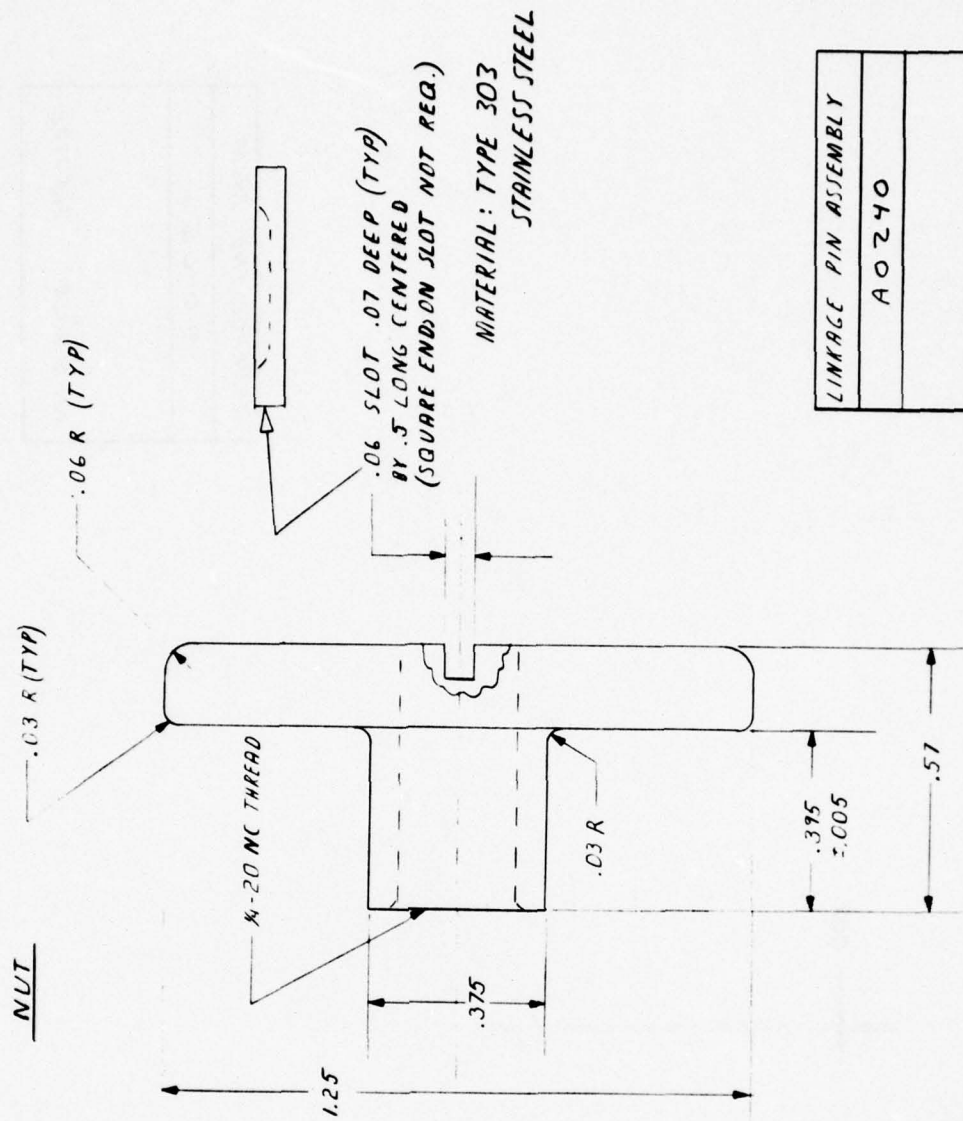


BACKREST LINK PLATE	
A0230	
	JOHN WIER EXT 7372

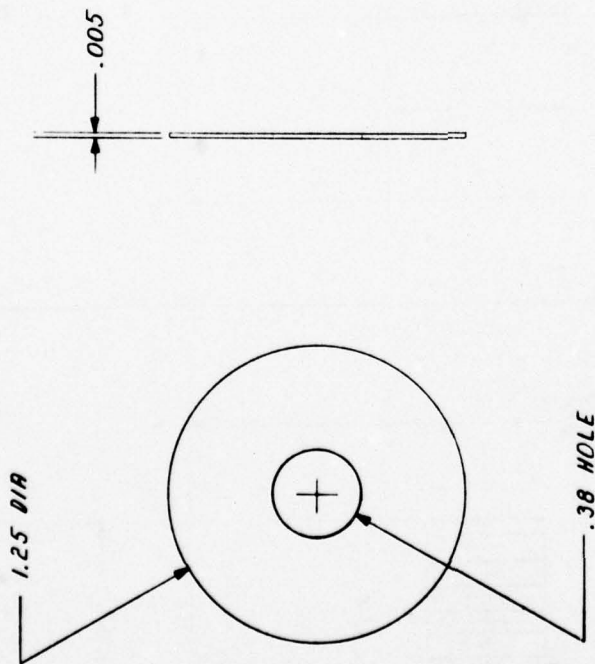
SCREW



NUT

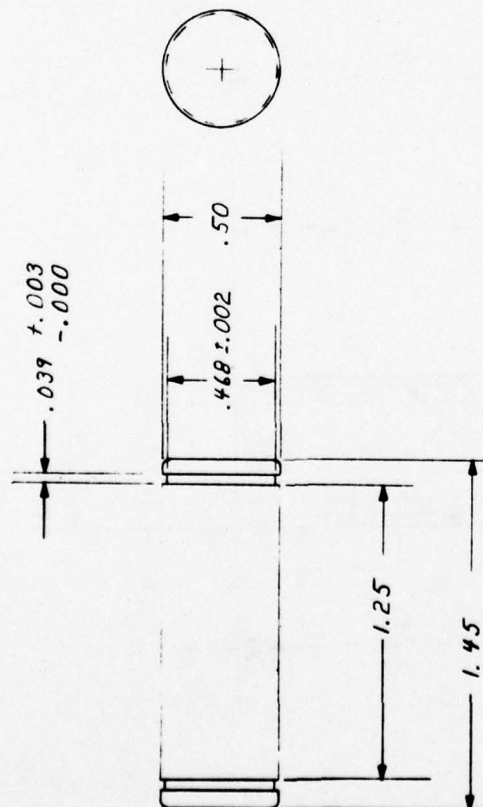


LINKAGE PIN ASSEMBLY
A0240
JOHN WIER EXT 7372



MATERIAL: CRES STL

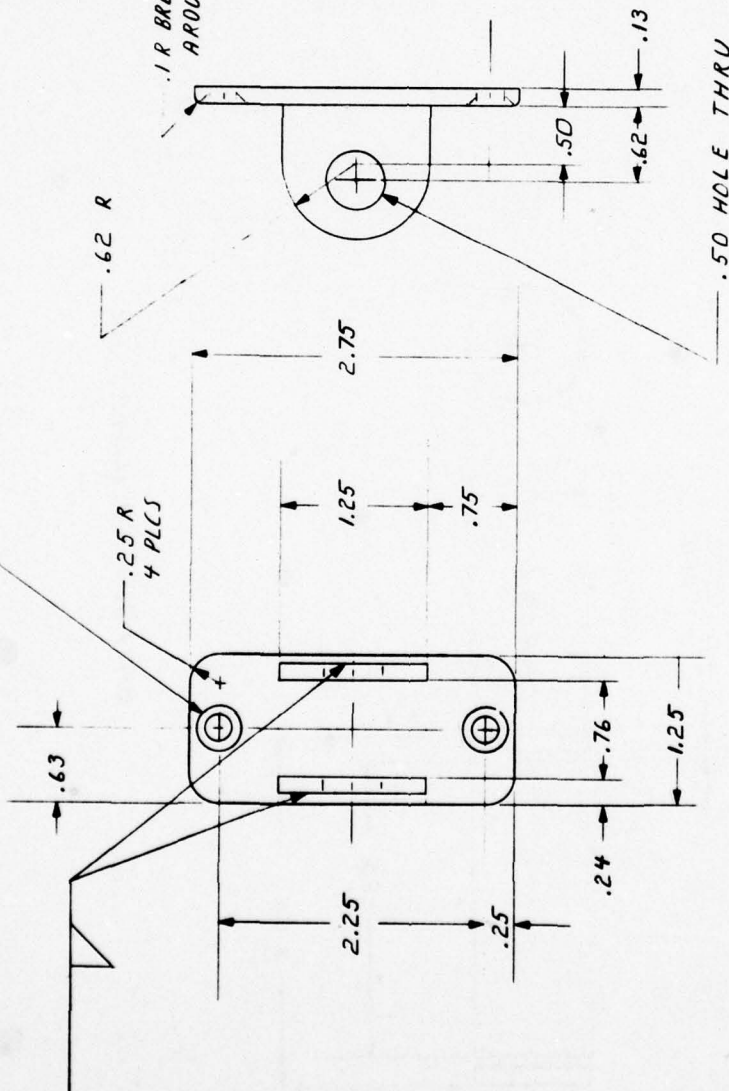
LINKAGE END SHIM
A0250
JOHN WIER EXT7372



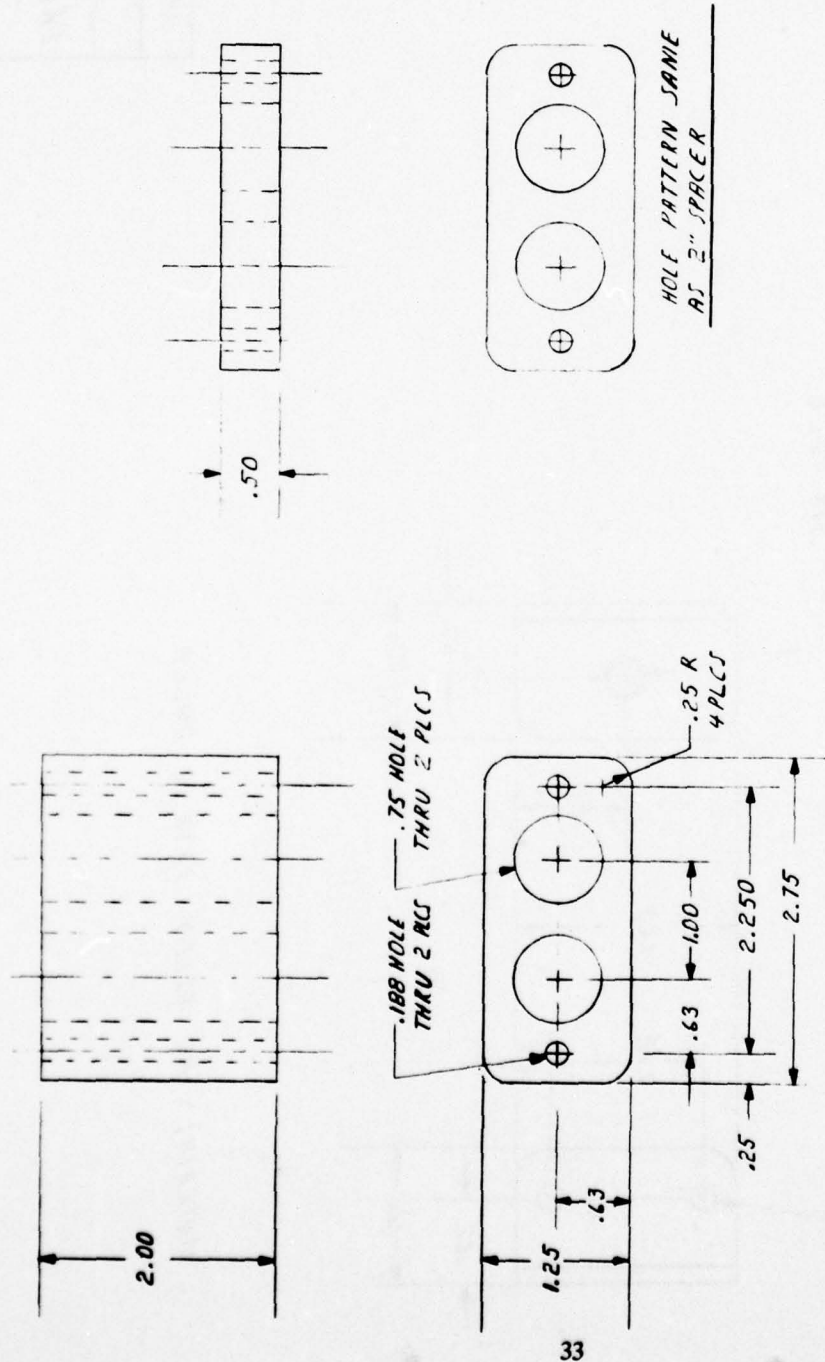
MATERIAL : 303 STAINLESS STL

JACK CLEVIS PIN
A 0260
JOHN WIER EXT 7372

.203 HOLE CSK R2° .35 DIA.
2 PLCS



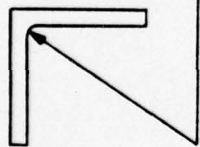
FOOT PLATE
A O 270
JOHN WIER EXT 7372



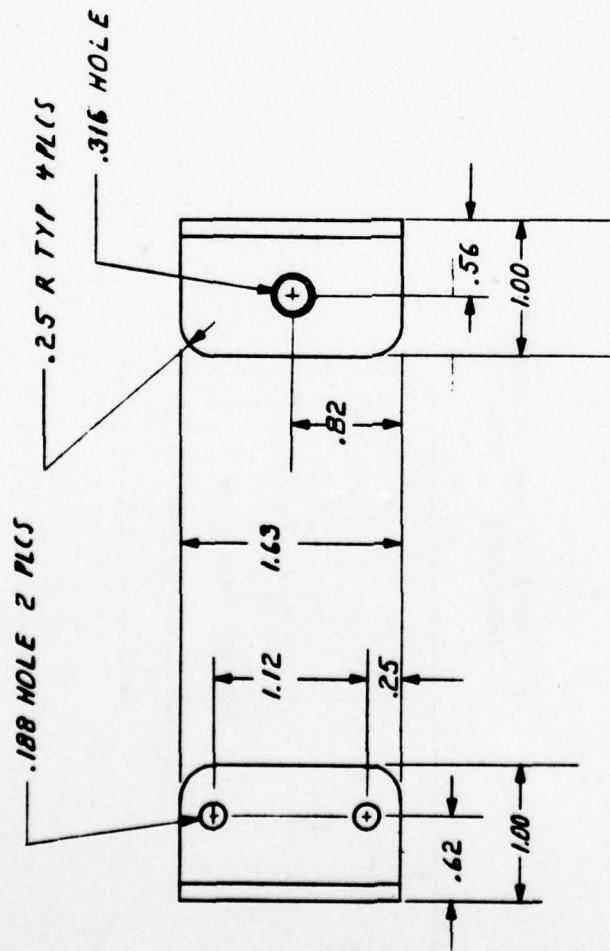
HOLE PATTERN SAME
AS 2" SPACER

MATERIAL: AL ALLOY

JACK MOTOR SPACER(S)	
A0280	
JOHN WIER	EAT 2372



RADIUS ANGLE IS PREFERRED BUT NOT REQ.

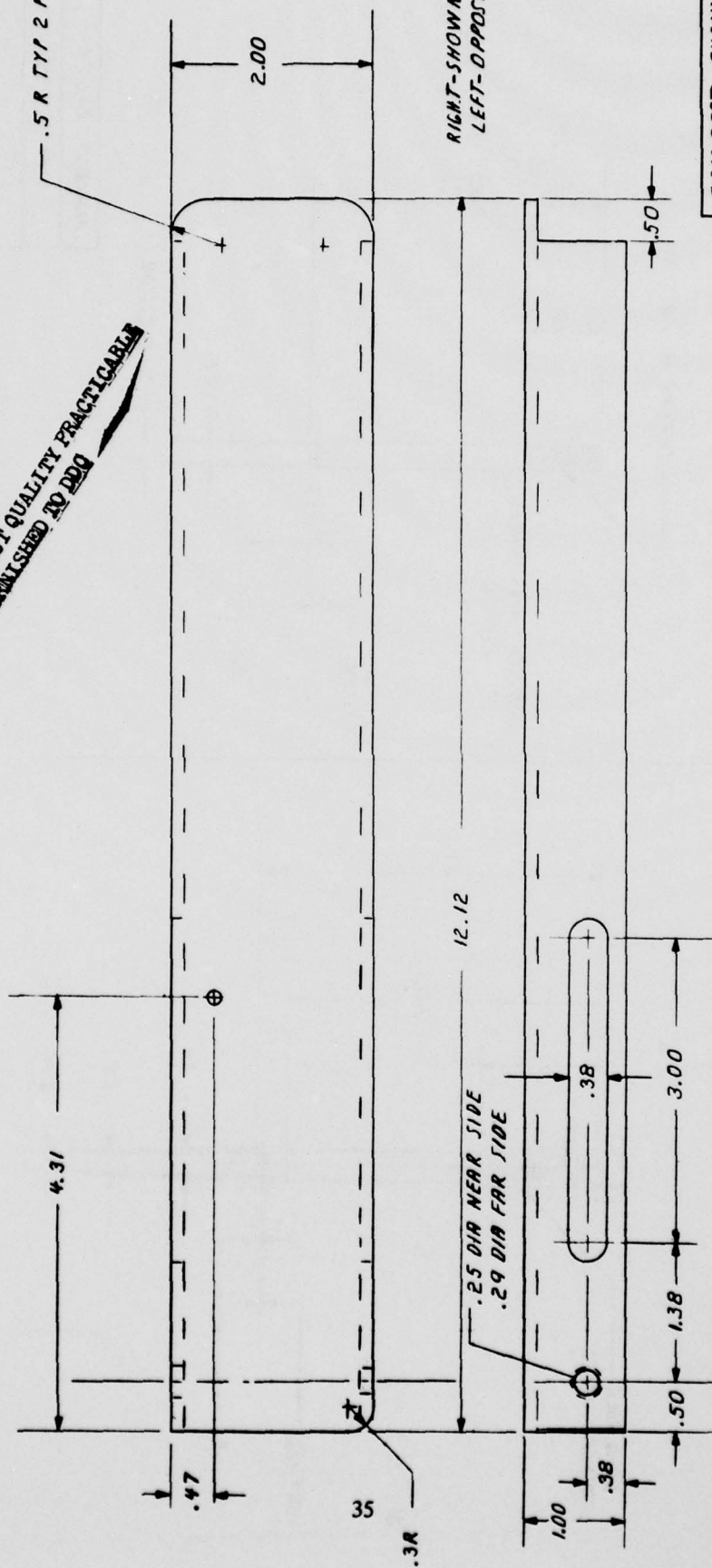


34

MATERIAL: AL ALLOY 1X1X.12 ANGLE

SPRING SUPPORT BASE
A 0 2 9 0
PRELIMINARY
JOHN WIER EXT 7372

5 R TYP 2 PLC-S



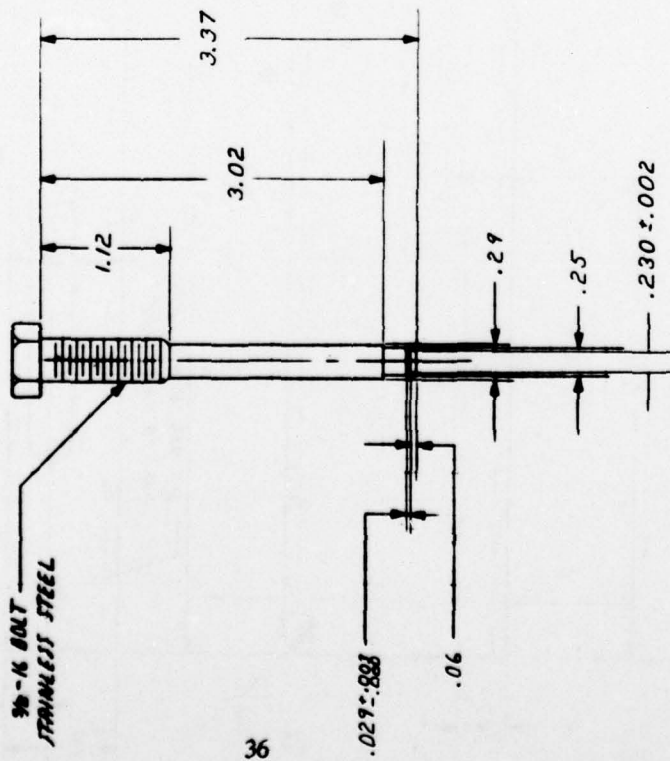
MATERIAL: AL ALLOY 6063-T5
ALCCA AL. EXTRUDED SHAPE
NO. 5527 OR EQUAL

ARM REST CHANNEL

AC300

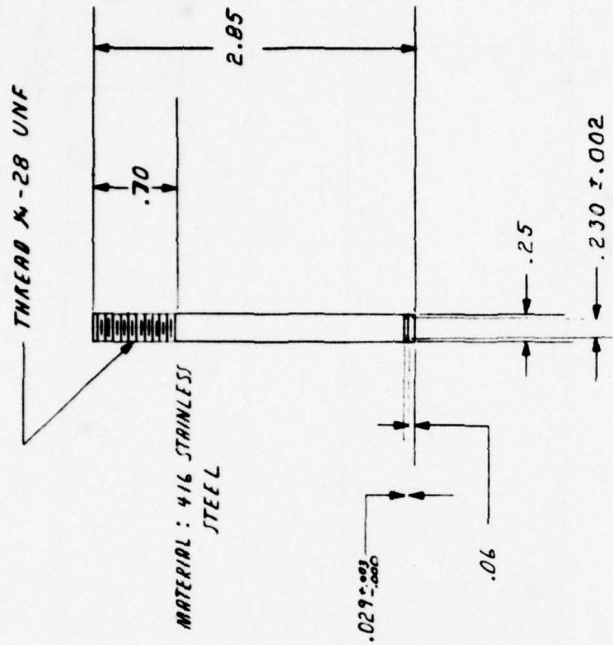
JOHN WIER EXT 7372

TYPE "A"



36

TYPE "B"

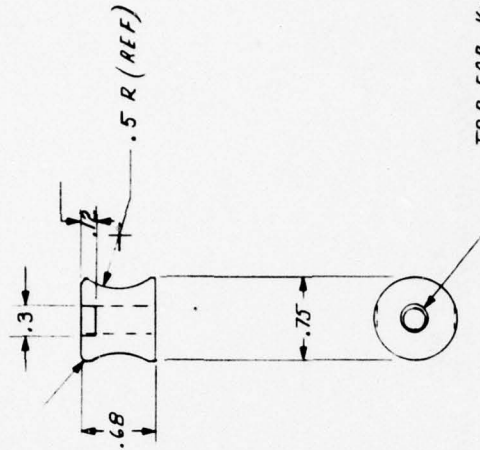


ARMIST BOLTS
A0310
JOHN WIER EXT 7372

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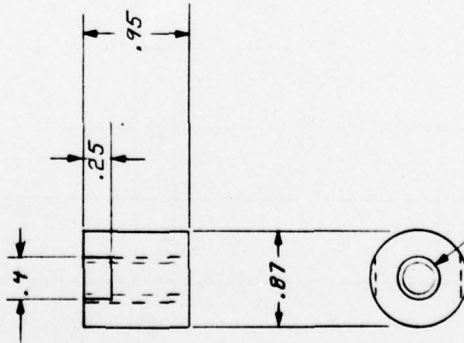
TYPE "B"

--- .06 R



MATERIAL: AL ALLOY 6061-T6 OR 2024-T4

TYPE "A"

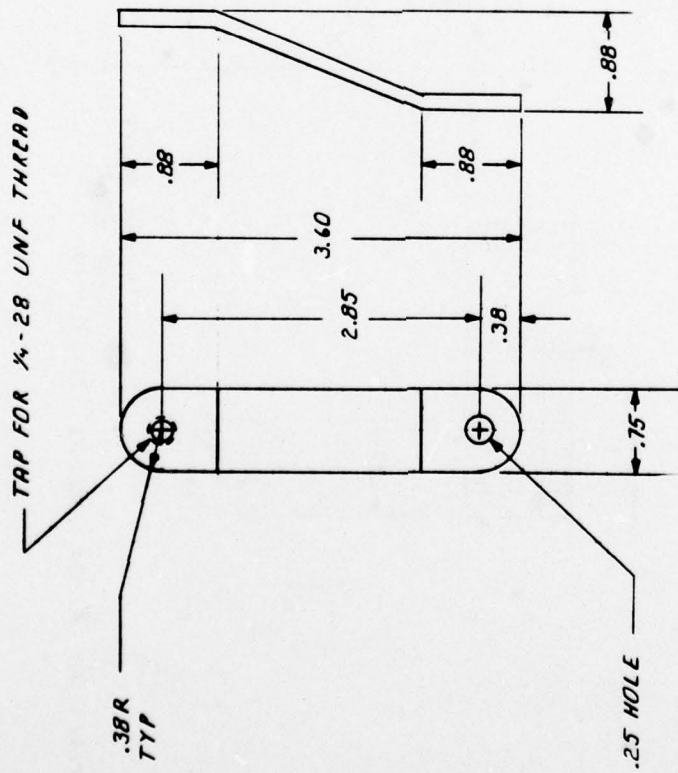


MATERIAL: AL ALLOY 6061-T6 OR 2024-T4

ARMREST NUTS
A0320
JOHN WIER EXT 7372

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MATERIAL : 302 STAINLESS STEEL
.134 THICK

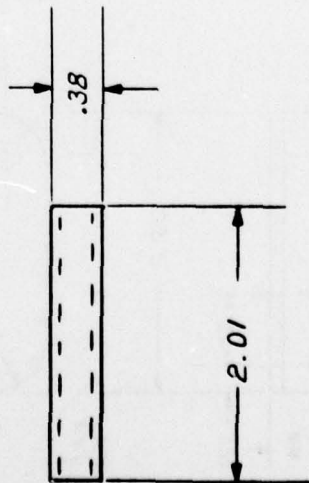


ARMREST LINKAGE
A0330
JOHN WIER EXT 7372

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ARMREST ROLLER		
	A 0340	
		JOHN WIER EXT 7372

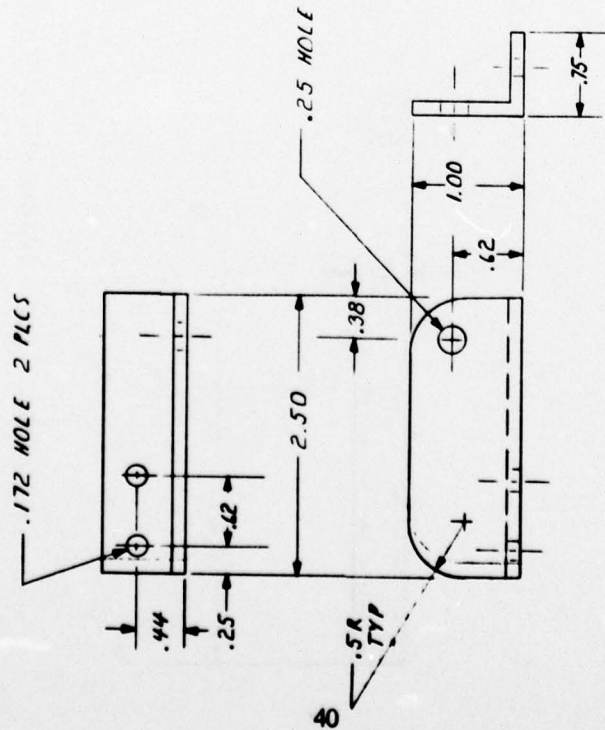
.25 HOLE THRU



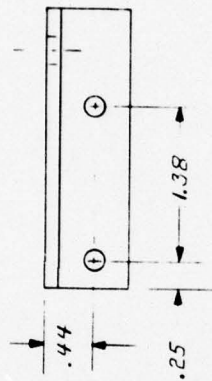
MATERIAL: 302 STAINLESS STEEL

MATERIAL: AL PLEDS 10.3.75 CRIGUAL
FINISH: HARD ANODIZE CLEAR

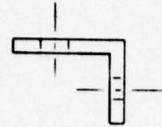
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RIGHT LOWER



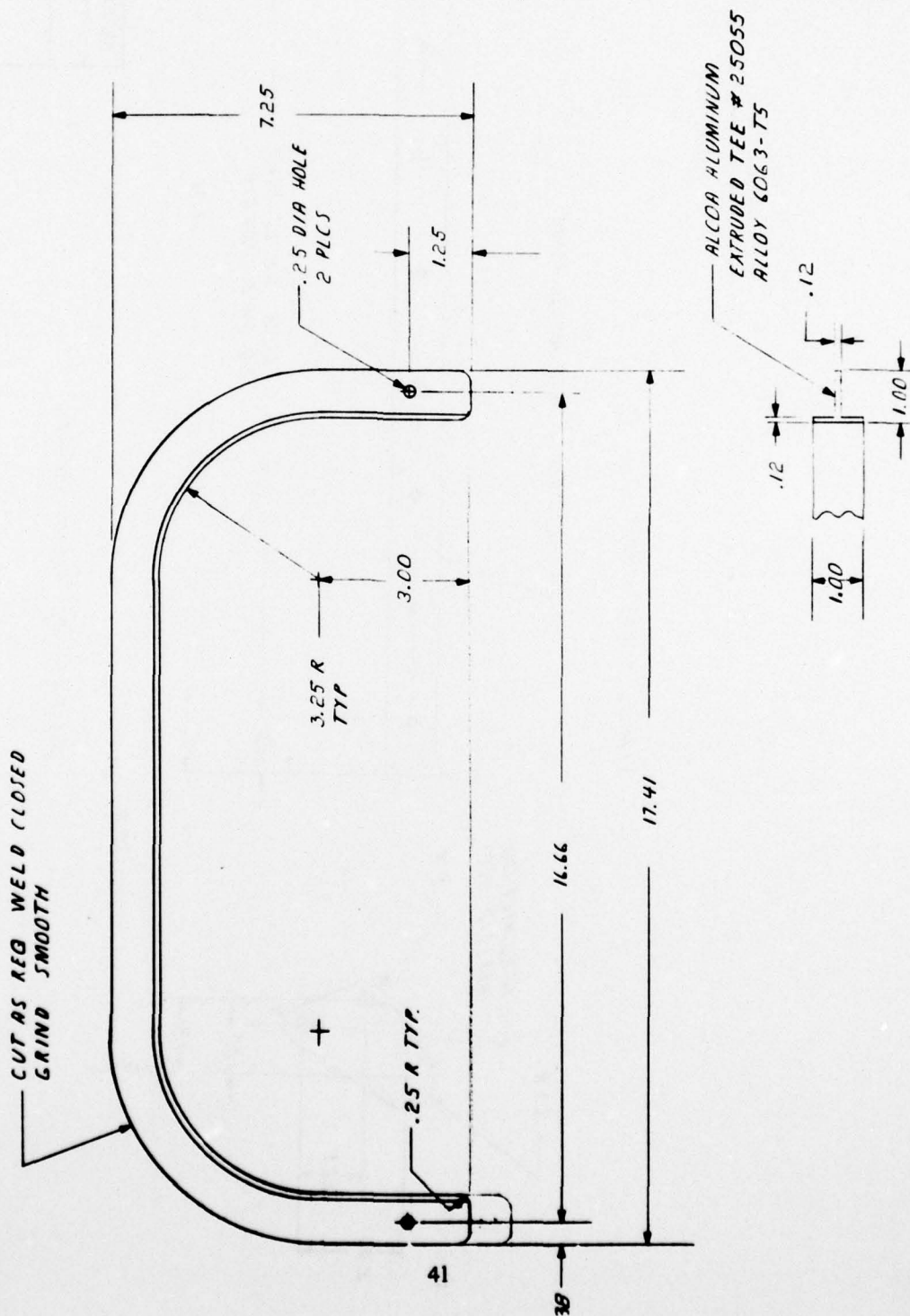
RIGHT UPPER

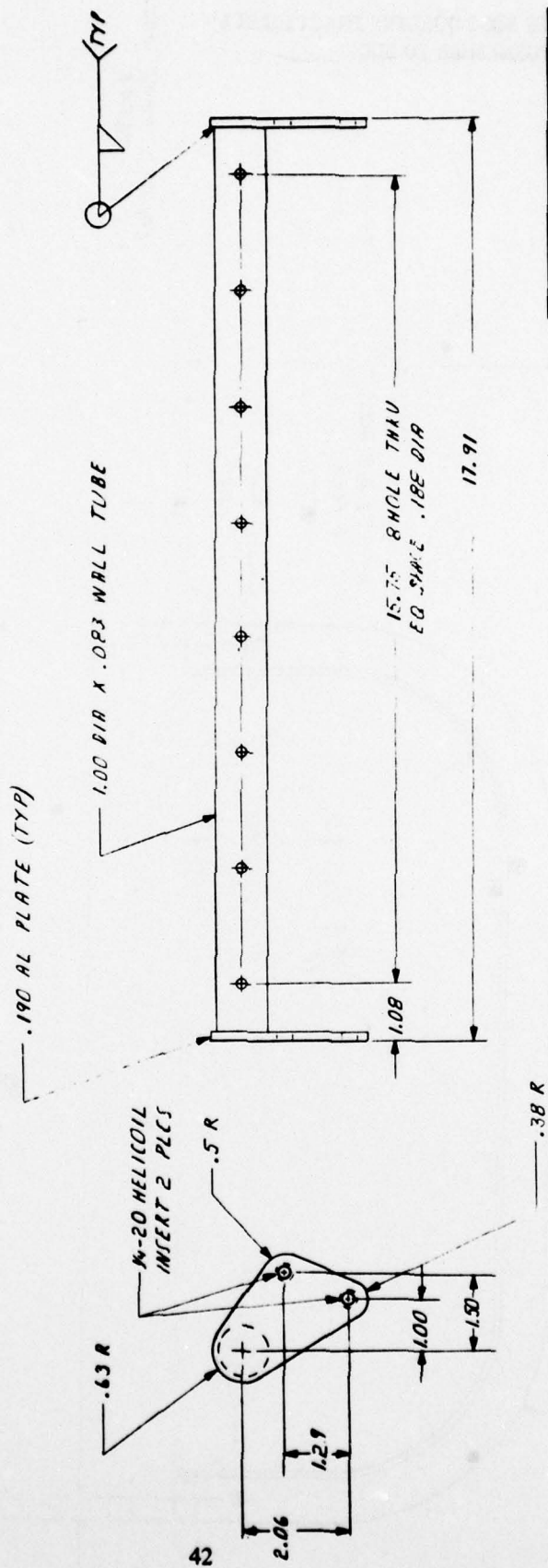


KNEE RESTRAINT BRACKET
A O 350
JOHN WIER EXT 7372

**FINISH: HARD ANODIZE
CLEAR**

WINEE RESTAURANT BAR		
A0360		
	JOHN WIER	EXT 7172

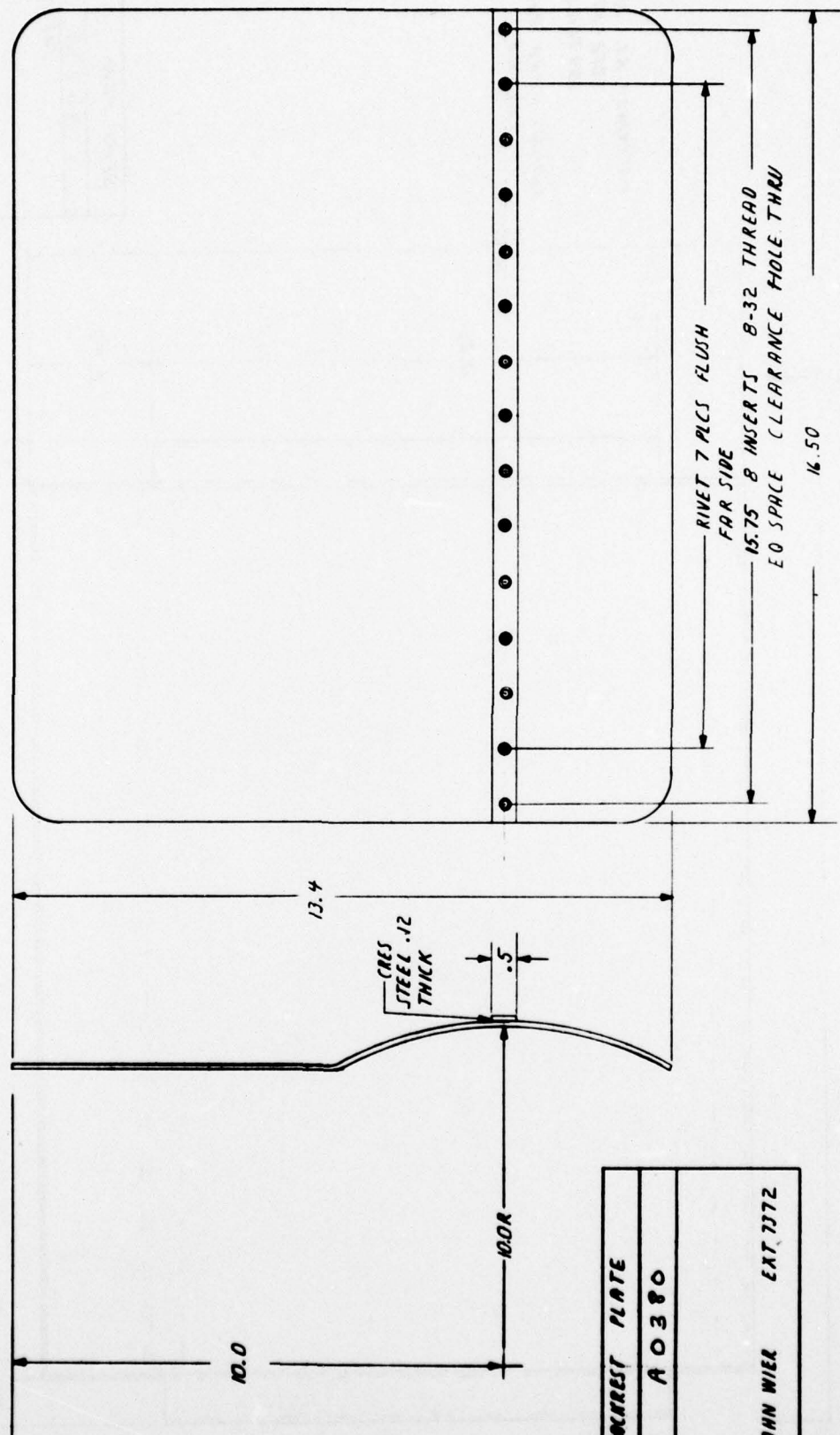




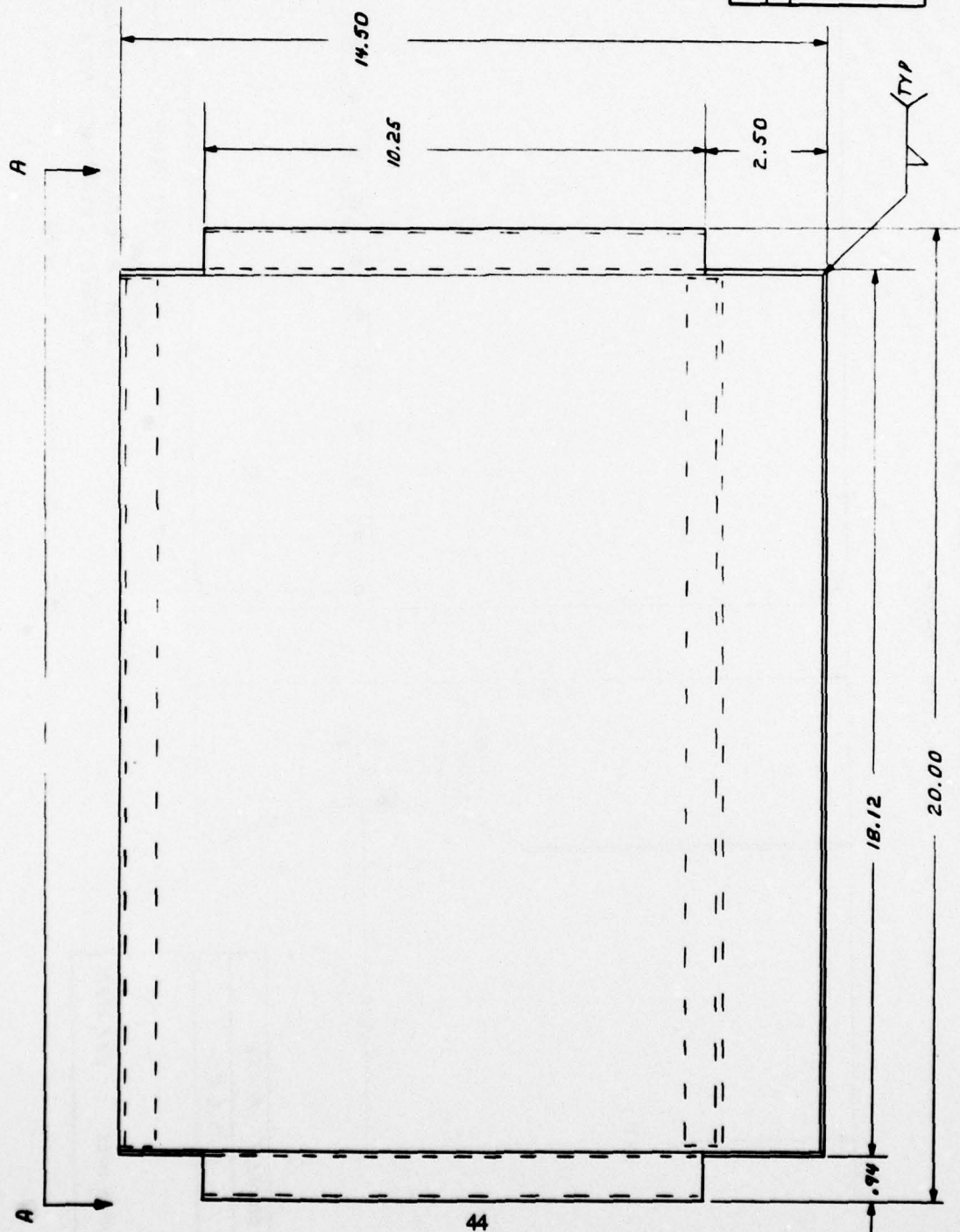
BACKREST SPREADER
A0370
JOHN WIER EXT 7372

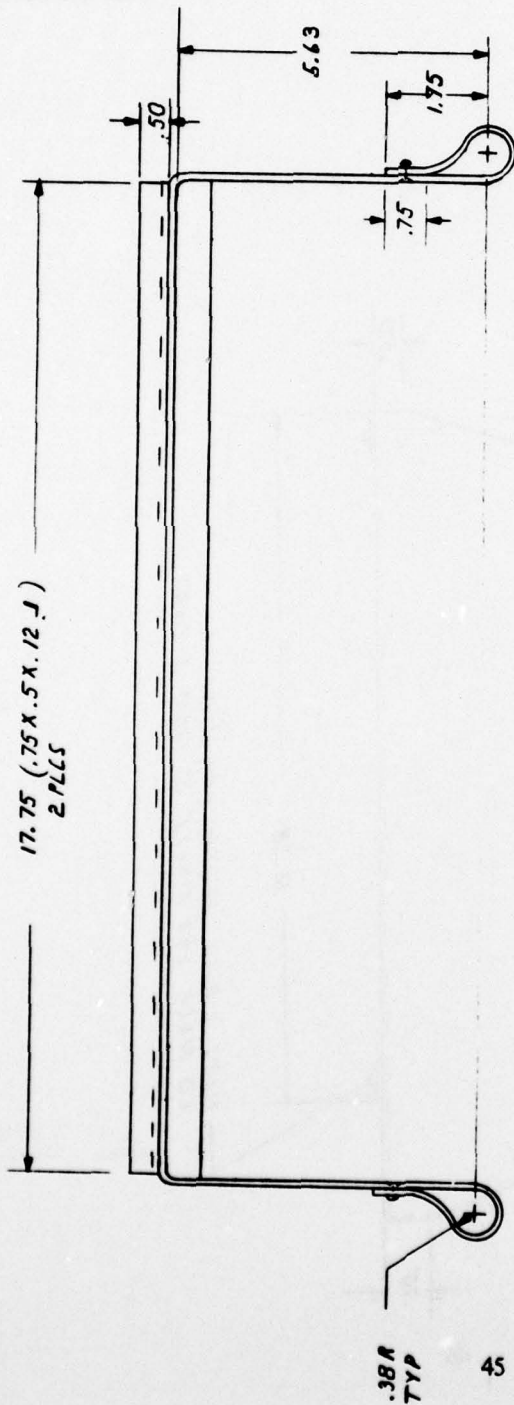
MATERIAL AL ALLOY 6061-T6

MATERIAL: AL ALLOY 7075-T6
(.09 THICK)

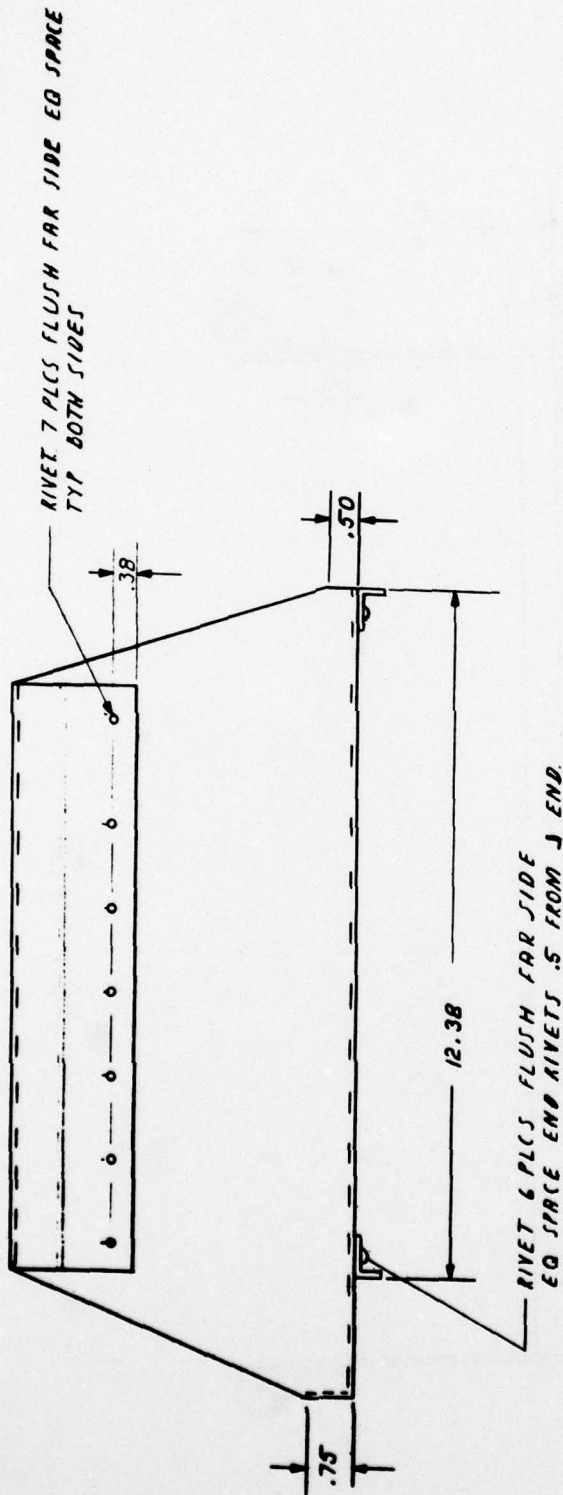


BRACKET PLATE	
A 0380	
JOHN WIER	EXT 1372

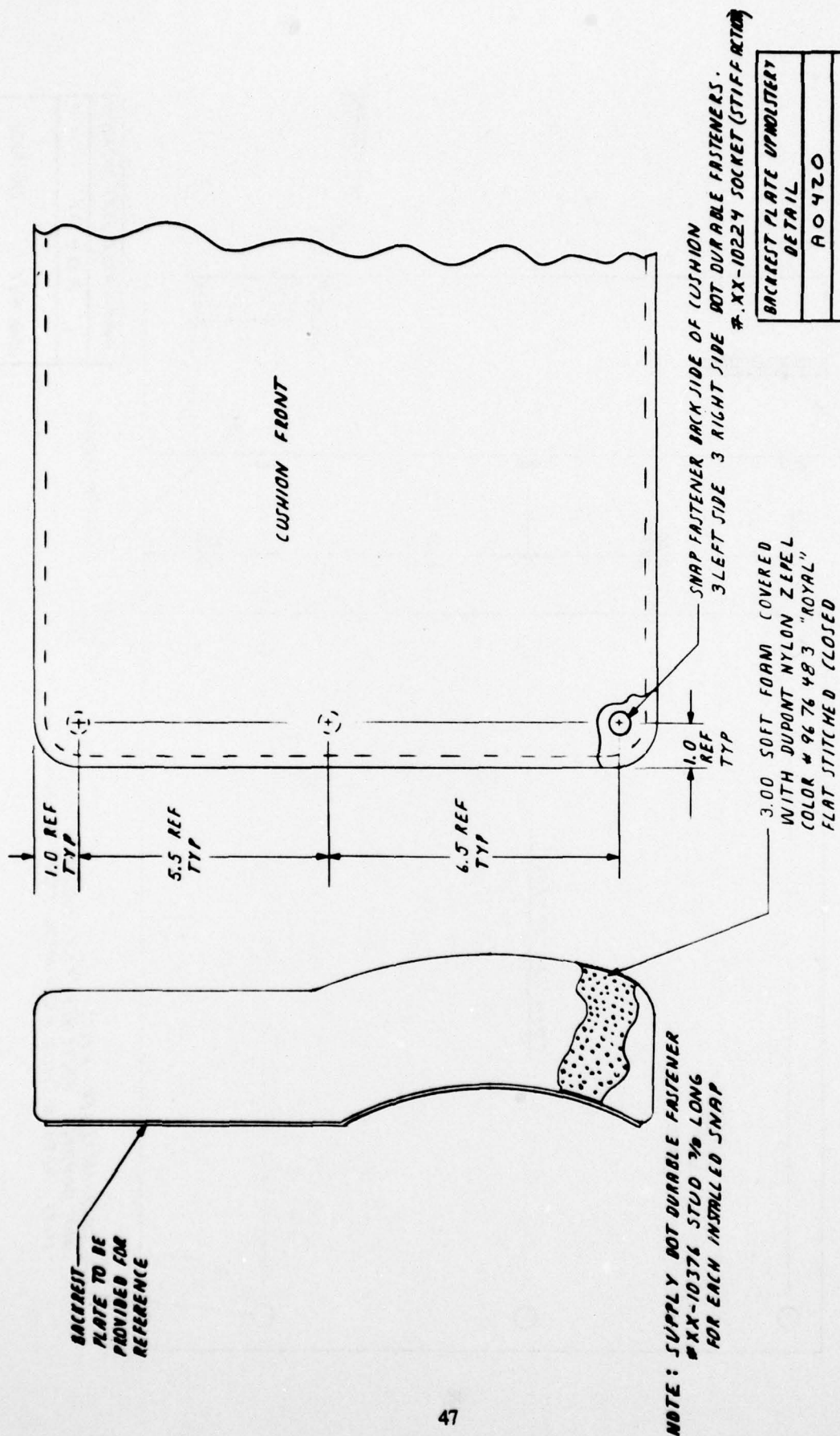


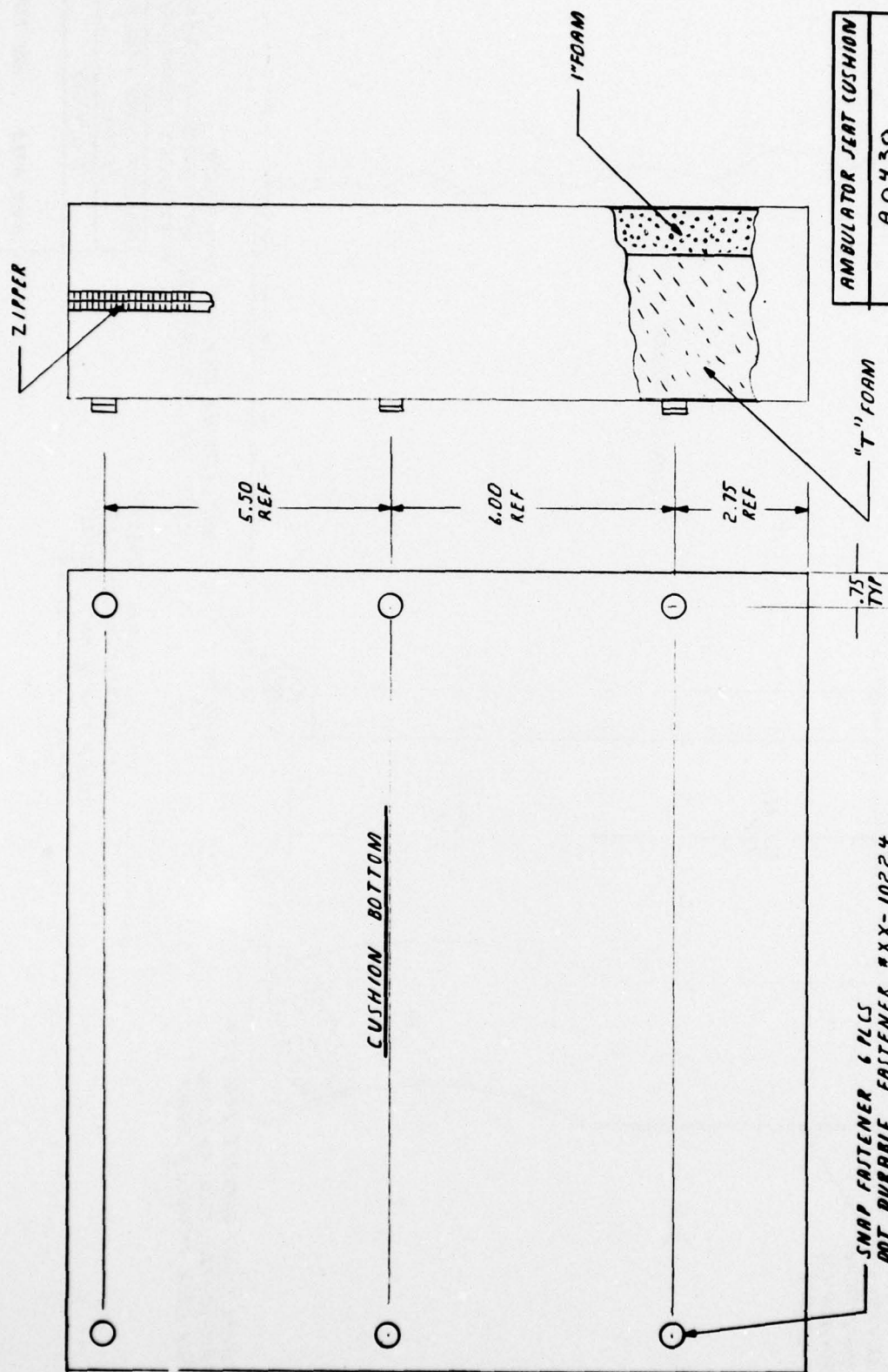


SEAT PAN	
A0400	SHT 2 OF 3
JOHN WIER	ENT 7772



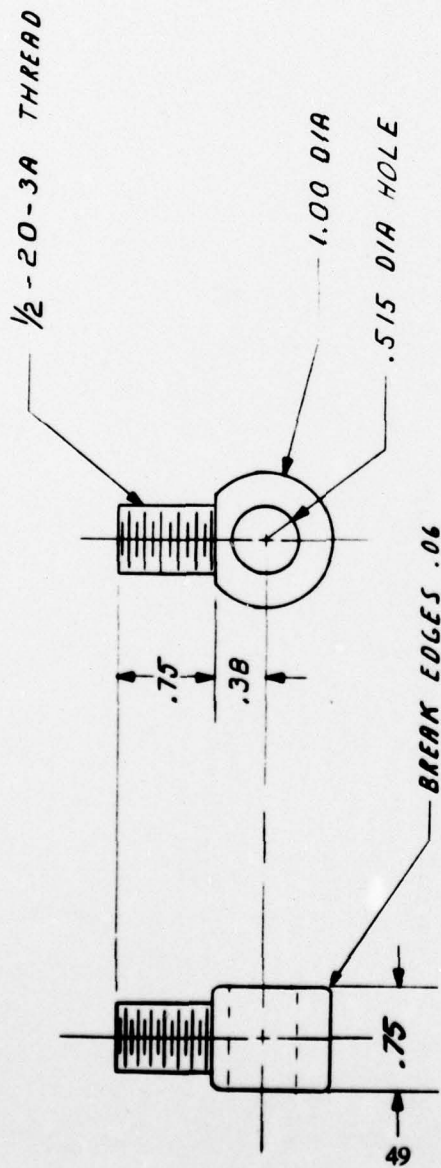
SEAT PAN	
A0410	SMT 3 OF 3
JOHN WIER EXT 7372	





AMBULATOR SEAT CUSHION
A 0430
JOHN WIER EXT 7372

SNAP FASTENER 6 PLCS
DOT DURABLE FASTENER #XX-10224
STIFF ACTION WITH #XX-10376 STVD 3/8 LONG



MATERIAL: 1018 COLD ROLLED STEEL

ACTUATOR CLEVIS
A0440
EXT 7372